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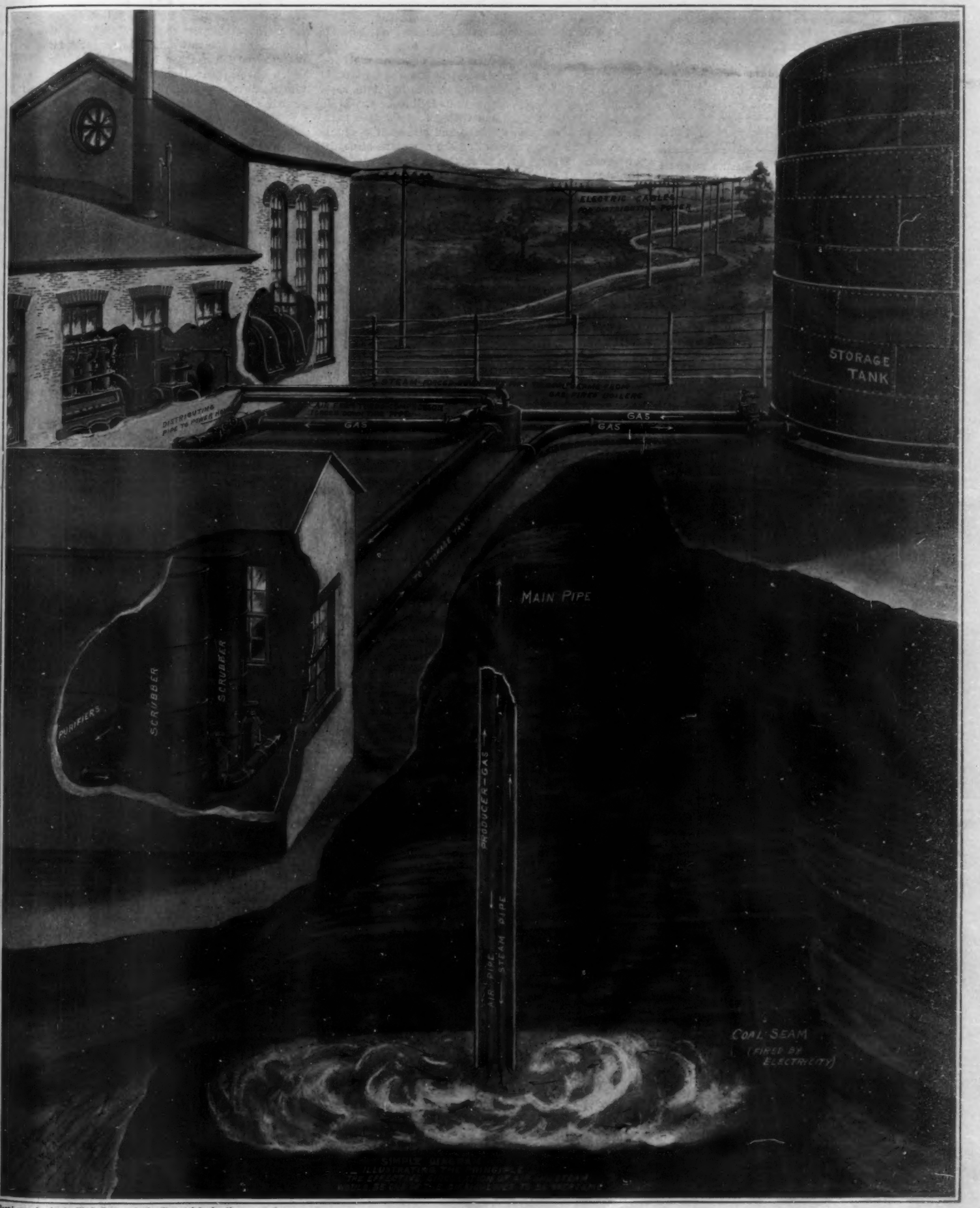

Based on a drawing by W. R. Robinson in the *Illustrated London News*.

Sir William Ramsay believes it will be possible to burn coal in the depths of the earth to produce gas conveyed by pipe to engines in a power house on the surface.

"Bring your gas engines to the mouth of your pit or bore-hole and produce your power there," urges Sir William. "You would thus have 30 per cent of the energy of the coal available as against 15 per cent available in fuel engines."—[See page 241.]

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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

The purpose of this journal is to record accurately, simply, and interestingly, the world's progress in scientific knowledge and industrial achievement.

A Promise Unfulfilled

THE failure of America to send a single machine across the line in defense of the Gordon Bennett Cup, proves that in spite of the brilliant work which has been done by individual Americans in promoting the art of aviation, as a nation we are lagging deplorably in the rear. When the winning French machine swept in faultless style over the course at Chicago, with not a single American entrant in the air to dispute its victory, the thoughts of some of the spectators must surely have gone back to that memorable day among the sand dunes of Kitty Hawk, when an American mechanic left the ground in a power-driven machine, and achieved the seemingly impossible by making a clean-cut flight of one half a mile through the air.

In some future age when aviation shall have been established as one of the accepted means of transportation; when the problems of starting, alighting and automatic stability have been fully solved and travel through the air shall have become as safe if not safer than travel by rail or sea, the man who sits down to write the story of the development of high-speed transportation, with its long record of brilliant achievements, will undoubtedly place at the head of the list that first successful essay of the late and ever-to-be-lamented Wilbur Wright.

Without casting the least reflection upon the admirable work done by European experimentalists, it can be truthfully said that the work of Chanute, Langley, and the Wright brothers has established beyond all disputation the right of America to be named as the birthplace of the most difficult mechanical feat ever attempted by man.

Having made such a notable start, America, by all reasonable expectation, should have continued to lead the world in the development of the new art. We are an ambitious and strongly competitive people; highly inventive; possessed of an inborn mechanical genius; and abundantly equipped both with facilities for laboratory experiments and with the necessary capital for development. Nevertheless, it is a lamentable fact that pre-eminence, both in the construction and flying of aeroplanes, passed at an early stage to Europe, where it has ever since remained. How far we have failed to fulfill our first great promise is shown by the recent fiasco of our attempt to defend the world's greatest aviation trophy.

Simple justice calls our attention to the fact that the present situation is due to causes national rather than individual. The two indispensable aids to development after the first start had been made, namely, governmental encouragement and the assistance of capital, have both been markedly absent. A certain amount of Federal aid has been extended, it is true; but in view of what is being done abroad, it must be admitted that it has been pitifully small. As for the advancement of capital, all that can be said is that if the financiers had shown one tenth of the enthusiasm and courage which have been manifested by individual inventors and experimentalists, we could easily have maintained the proud position which was won for us by the patience and zeal of the Wright brothers.

Furthermore, outside of those highly-to-be-commended individuals who have not hesitated to embark their time, labor and all too-slender means in the development of the aeroplane, there has been a strange lack of public interest in the subject. Beyond going in some numbers to witness the spectacular feats of a few airmen at the aviation meets, we seem, as a people, to have been perfectly content to mark time and watch the European nations turn to practical and national advantage what we have so well begun.

The insignificant position now held by the United States in practical aviation was strikingly shown by the Hon. William G. Sharp, in a recent speech before the House of Representatives:

"If I were to use a blackboard at the front of the clerk's desk and illustrate in another manner the relative extent of our development as compared with that of other countries in this most important work, I could draw a line at least 3 feet in length to represent the position of France, and then away down at the bottom, after such countries as Austria and Italy, I would have to draw one, not exceeding an inch in length, representing its growth in the United States. Or, if I were pictorially inclined and wished to draw upon that blackboard a modern aeroplane and give to it a width of plane of 3 feet, representing the aeroplane strength of France, taking up almost the entire size of the blackboard, I could fairly represent the relative position of the United States Government by pinning upon it one of the smallest butterflies that you may see playing about the Capitol grounds.

"Perhaps a better way of putting it in a dollars-and-cents aspect would be to say that we appropriated, as you gentlemen remember, in a bill reported out of the Committee on Military Affairs, $75,000 for the construction of aeroplanes for the Army for the ensuing year. For a like period France contributed over $4,000,000. Germany came a close second; and then England, Italy, Austria, Russia, and one or two others of the smaller powers."

Our lack of practical interest in aviation may be explained on several grounds. The slight degree of assistance rendered so tardily by our Government may have been due to an over-developed conservatism; the failure of capital to interest itself may have been due to a conviction that the time had not arrived when investment would give any reasonable prospects of profitable returns. But the failure of the public at large to interest itself greatly in aviation as a sport is perplexing. We are strongly imbued as a people with that competitive instinct which is essential to the development of sport. We follow the fortunes of our athletes at an Olympiad with the keenest interest and turn out *en masse* to welcome them on their victorious return. We squander millions in the defense of a yachting trophy, and spend hours in watching a couple of yachts contest in slight and drifting winds for an international cup; but when it comes to the defense of a trophy which represents the highest achievement in an art whose genesis was due to our own perseverance and ingenuity, we stand supinely by and allow the prize to be snatched from our midst without making any adequate effort to defend it.

Perhaps some of the readers of the SCIENTIFIC AMERICAN can offer an explanation of this anomaly. We shall be pleased to throw our correspondence columns open for a discussion of the subject.

The Steel Rail

IF we were asked to name the one product of the foundry and rail mill which is called upon, in its daily service, to perform the most exacting and destructive duty, we should select offhand the steel rail, and particularly the American steel rail—for it is certain that in no country of the world is this overworked member subjected to such violent usage. Acting as a bridge to carry the wheel loads from tie to tie, it must endure bending stresses such as no engineer would dream of imposing upon a plate girder or a truss bridge. A reversion of stress in any member is notoriously trying and destructive; yet the steel rail (especially if the track is not in first-class condition) is subjected to reverse stresses of the heaviest character. So complicated are the forces which act upon the rail, that their exact analysis would defy all the skill and apparatus of the most complete testing laboratory in the world. Stresses of compression, tension and torsion follow each other in swift succession, and they are frequently acting at the same time and in large quantities in any given length of rail. Finally, as if this were not sufficient, the rail itself is treated as an anvil and subjected to a fierce pounding whose hammer blow is often sufficient to flatten it down, if indeed it does not break it clean in two.

Now, one would expect that a member which is to be subjected to such severe uses, upon which is imposed such exacting duty, would receive every assistance that careful selection of the materials of its composition, and patient carrying out of the processes of manufacture, could afford. But unfortunately the demand for steel rails is so enormous, and often so very urgent, that there has been a strong temptation for the manufacturer to sacrifice quality to output. Processes for which, if the product is to be reliable, time and patience are an absolute necessity, have been "speeded up." The result has been a rate of manufacture and a magnitude of output that are one of the wonders of modern industry. But there has been another result just as marked, and that has been the depreciation in the wearing quality, strength and general reliability of the rail.

The recent meeting of the International Institution for the Testing of Material has shown how fully these facts are realized and how earnestly engineers the world over are seeking for the proper remedy—the reasonable compromise. Reliable rails can be produced for a reasonable price to the railroad, and at a reasonable profit to the rail mills. In an early issue we expect to publish further letters in addition to those which have appeared on this subject, and shall enter into a more complete discussion on the causes and remedies for the present conditions.

The Atlantic Inland Water Route

IF we do not hear so much in these days about the military advantages of the proposed Inland Water Route along the Atlantic Coast, it is not because those advantages are any less real, or any less, than they were some years ago, but rather because the great commercial advantages of the scheme are becoming increasingly evident.

In the event of the blockade of the Atlantic and Gulf ports and harbors by a superior force of the enemy, there can be no question that the existence of an interior water route, linking together the blockaded points and putting them in water communication with one another, would have an important bearing upon the situation. The waterways, which would generally be far enough inland to be removed from attack by the enemy, would make it possible to concentrate a powerful fleet of destroyers and submarines at any selected point on our coast line, and the concentration could be made with such absolute secrecy that the enemy would be in ignorance of the point at which the attack was planned and could make no special provisions to meet it.

It is as a commercial proposition, however, that the proposed waterways call most strongly for recognition and support. Not only will the transport of freight, because of the sheltered character of the route, be accomplished with greater safety, but there will be an inevitable and considerable lowering of transportation rates as compared with those that obtain over the present routes by rail.

In his recent address before the Atlantic Deeper Waterways Convention, Mr. Acker, the president of the Philadelphia Chamber of Commerce, pointed out that the new route will enable manufacturers in New England to procure their coal and their cotton from the South and send their manufactured products to New York, Philadelphia, Baltimore, and other important points along the proposed route at lower through rates than at present. Furthermore, the claim is well made by the advocates of this scheme that its completion will surely stimulate the interchange of commodities along the whole line of the proposed route. Centers that are now separated by geographical conditions which render the interchange of trade difficult and unprofitable will be provided with the cheapest known method of transportation; and it is perfectly reasonable to believe that the towns and cities contiguous to or within easy reach of the waterways will be commercially greatly benefited.

We heartily agree with Mr. Acker that there is no necessary antagonism between rail and water transportation interests. On the contrary, if they are properly regulated they are complementary to each other. With intelligent regulation, heavy freight in bulk will be carried by water and the lighter and fast freight by rail.

An Automobile Repair Shop for Aeroplanes

AN automobile of somewhat curious design is being put in use for the aeroplane service in the French army, and it forms a veritable machine shop for making all the needed repairs upon aeroplanes. No doubt it will prove valuable from the fact that it can be quickly brought to the spot where an aeroplane in a disabled condition may require its help. It has the shape of a large covered power wagon with motor and driver's seat in front. An electric transmission is used on the car. The inside space gives room for a number of tools such as a lathe and an emery grinder, both driven by electric motors, also a portable forge and carpenter's and machinist's benches with tools. Aeroplane pieces can be readily repaired and even new pieces made. Electric lighting is used throughout the car.

Engineering

Naval Skeleton Mast Under Fire.—It is unofficially reported that the skeleton mast which was erected on the old "San Marcos" to test its resistance to gun fire, stood up remarkably well under bombardment by large guns and more than fulfilled the theories on which it was built. We hope to give official particulars at a later date.

Latest German Battle Cruiser.—The latest German battle cruiser "Goeben," during her recent forced-draught trial, maintained for several hours a speed of 28.40 knots. This vessel is a sister ship to the "Moltke" which recently visited this country. The "Moltke," since her going into commission, has made slightly over 29 knots; therefore it is reasonable to suppose that when her machinery is shaken down the "Goeben" will equal that record.

Russian Head of Material Testing Association.—The Sixth Triennial Congress of the International Association for Testing Materials, before adjourning, elected as its new international president, N. Belelubsky of St. Petersburg, who is the professor emeritus of the Institute of Engineers of Ways of Communication of the Emperor Alexander I. The Congress decided in honor of the Russian scientist to hold its next international conference in St. Petersburg in 1915.

Columbia University Research Department.—In connection with the recent gathering of the Association for Testing Materials it was announced that a large gift had been made by Edward W. Browning for a research department, which will establish testing laboratories similar to those maintained so successfully by the German government, whose scope of work will take in anything from a sheet of writing paper to the material for a modern gun. This is good news which will be welcomed by every practical scientist and engineer throughout the country.

Auxiliary Sailing Schooners.—Mr. George Westinghouse is strongly of the opinion that the typical American sailing schooner of many masts has a great future before it in the ocean-carrying trade, provided that it is equipped with auxiliaries. He believes that the best auxiliary will be a 750 horse-power turbine provided with reduction gear, such a plant being suitable to a 5-masted schooner of 5,000 tons. He believes an average speed of eight knots is practicable and that the economy would be such that these vessels would excel the typical tramp steamer as an economical freight carrier.

The "Half Moon" in the Hudson.—Those of us who are interested in historical relics will be glad to learn that the "Half Moon," which was presented to this country by Holland during the Hudson-Fulton celebration, has been given a permanent anchorage opposite Yonkers in the Hudson River. The little craft has been thoroughly overhauled and put in first-class condition; and it is sincerely to be hoped that this most interesting vessel will continue to receive the constant care which its intrinsic value as a faithful replica of Hudson's ship and as a gift from a friendly government, demands.

Reclaiming the Jersey Meadows.—The members of the American Peat Society, which recently held its annual convention in this city, visited the Jersey meadows where they inspected several hundred acres of peat bog that are being reclaimed and cultivated. After eight years of development some two hundred acres are yielding, in lettuce and onions, from 600 to 1,000 bushels per acre, while the yield of celery is said to average about 3,000 dozen per acre. The results obtained in this locality should prove a great stimulus in similar work of reclamation on valuable but undeveloped bog lands throughout the country.

To Safeguard Life and Limb.—The Allegemeine Electricitaets Gesellschaft of Berlin has cabled President Arthur Williams of the American Museum of Safety, that the Rathenau Gold Medal has been placed at the disposal of the Museum, for award annually for the best device or process for safeguarding life and limb or promoting health in the electrical industry. The competition is open to every country in the world, but the device or process must be exhibited at the American Museum of Safety in New York city. We congratulate the American Museum upon this distinct European recognition of the very good work it is doing.

Automatically Recording Sea Temperatures.—The superintendent of the Johns Hopkins Botanical Gardens, William H. Witte, has given to the public his ingenious plan for automatically recording changes in sea temperature when a ship is passing through the ice fields. Water flows through a small tank in the bow of the vessel, in which three distinct appliances serve to record the changes of temperature. These include a high and low thermometer, a copper plate whose lengthening or shortening operates a lever and records the changes of temperature on a revolving drum, and series of tubes filled with alcohol, the tubes being connected by a small alcohol-filled pipe with a diaphragm, which through a lever and a pen also records the changes of temperature on a drum. All records may be read in the pilot house.

Electricity

Electro-hydraulic Steering Gear for Vessels.—The general utilization of the electric light on board large vessels invites the replacing of steam steering gear by an electric motor-driven gear. In an electric gear recently developed an intermediate system of hydraulic cylinders protects the motor from the mechanical shock of waves upon the rudder. The motor runs continuously, driving a special pump the flow of which can be instantly stopped by the steersman or directed to either of the two hydraulic cylinders operating the rudder.

Aluminium Conductors in Winter.—One of the arguments directed against the use of aluminium for transmission lines is that, in winter time, they will collect a thicker coating of ice and snow because of their large diameter and, hence, will sag more than the copper wire of equal carrying capacity. A writer in *Elektrotechnische Zeitung* believes that this contention is based on a fallacy. He has found that in Norway the copper telephone wires of 4 millimeters (0.16-inch) diameter become just as thickly coated as the aluminium cables of 300 square millimeters (0.46 square inch) section.

Freeing the Hands in Telephoning.—In using the telephone one's hands are tied by the necessity of holding the receiver to the ear by the left hand and by the habit of picking up the ordinary desk telephone set in the other hand. A British inventor has devised a simple arrangement for freeing both hands and thereby saving time. In "holding the line" one places the receiver on a platform which presses the earpiece against the small end of a sound-magnifying trumpet. The trumpet—not unlike a flattened motor-car horn in shape—talks out into the air, enabling one to hear while leaving both hands free for looking up references or filling the waiting time in any other way.

Electric Miners' Lamps.—A recent English government competition for the best electric lantern suitable for miners' use has brought out several creditable lanterns designed to meet the rather difficult specifications imposed. One of the prize-winning lanterns is so well constructed and so completely gas-tight (to avoid all risk of igniting firedamp in the mine by an electric spark at the switch) that the lantern may be used under water if necessary. All contacts are made inside the case. Careful construction of the lantern as a whole and of the single storage cell which furnishes the current for the 2 candle-power lamp gives a weight of only 3½ pounds, the same weight as an ordinary miners' oil-burning "safety" lantern.

A Powerful High-tension Electrostatic Machine.—A large 20-disk influence machine capable of generating potential differences up to 320,000 volts has been built in Paris for experimental work on high direct-current potentials. This machine is designed for strength, permanently good insulation and freedom from vibration in running, and in appearance savors of the commercial rather than of the experimental. The ten pairs of ebonite disks, 73 centimeters in diameter, are rotated in opposite directions at 1,500 revolutions per minute by individual belts from an electric motor-driven main shaft. Any disk may be withdrawn very readily for the inspection and cleaning necessary to keep the machine in working order to give its maximum output.

Diffusing Bulb for Tungsten Lamps.—Owing to the extreme brilliancy of the incandescent tungsten filament, various methods have been tried to diffuse the light either by frosting the bulb or by using a shade or globe. Such means, however, have the defect of absorbing a large proportion of the light. A patent has been recently granted to Mr. Peter Cooper Hewitt on a lamp bulb formed with parallel longitudinal grooves in the outer surface. The lamp is thus formed into a myriad of long narrow prisms which diffuse the light so that the entire bulb seems to be aglow. The light of the filament being spread over a large surface is not so painful to the eye. At the same time practically none of the light is lost as in the case of the frosted bulb. The lamp bulb is grooved by etching the glass with hydrofluoric acid.

Conductive Ink.—Two patents were recently granted on ink which is electrically conductive when dry. The inventor, Mr. H. E. Goldberg of Chicago, has discovered that metals in the colloidal form in a volatile liquid may be used as ink, and that when spread upon the surface and the volatile element has evaporated, there is left a metallic layer which is continuous and electrically conductive. Many metals such as silver, gold, platinum and copper, also graphite, may be rendered colloidal by forming a direct current arc under water between terminals consisting of the metals. The metal is so finely divided as not to precipitate under the action of gravity from the liquid in which it is diffused. The various metals produce different colored inks. Silver colloid will produce gold colored marks or even grass green. Colloidal graphite produces black or grayish black marks, but is not as electrically conductive. By combining silver and graphite an ink is obtained which is substantially black and has good conductivity.

Science

Prof. Francois Alphonse Forel died at Morges, August 7th, at the age of 71 years. To the world at large he was best known as an authority on the Swiss lakes—especially Lake Geneva—but his investigations embraced a wide range of subjects in physiology, zoology and geology.

Coffee Without Caffein.—The American consul at Tamatave, Madagascar, has sent to the Bureau of Manufactures in Washington samples and photographs of a natural caffein-less coffee growing in that island. It is locally known as "mantaska" or "café sauvage," grows to a height of 12 to 20 feet, and resembles the ordinary coffee tree, but has smaller leaves and a yellowish berry.

Black Opals are commonly the result of artificial coloring, but true black opals have been mined in a small district at the head of the River Darling in northern New South Wales during the past nine years. The output was at first very small, but for a few years amounted to 30,000 to 40,000 per annum. At present, according to a consular report from Adelaide, they have become extremely rare, hardly any having been found during the last nine months.

The Brahmaputra Expedition, recently undertaken by the British authorities in India to punish the Abor tribesmen for the murder of Commissioner Williamson, has not yielded all the geographical information that was hoped for, as it was not found possible to explore all the unknown portion of the Brahmaputra-Tsangpo. However, a total of 35 square miles was surveyed, materially reducing the unexplored part of this territory, and much other scientific work was accomplished. Incidentally, the attempt to chastise the Abors was a failure.

The Royal Geographical Society, generally recognized as the foremost organization of its kind in the world, is about to emerge from the crepuscular purlieus of Savile Row, and take possession of a fine residence facing Hyde Park. The Society has bought Lowther Lodge, with two acres of grounds, having frontages to Prince's Gate and Kensington Gore. Here it will have most of the accommodations of a first-rate club, and room for the growth of its splendid library, map rooms, etc.

Dust from the Tail of Halley's Comet, according to M. Marchand, of the Pic du Midi Observatory, is responsible for the coronas that have frequently been seen around the moon in perfectly clear weather ever since May 19th, 1911. It is well known that the angular size of a corona depends upon the size of the solid or liquid particles in the air which diffract the light; the smaller these particles, the larger the corona. M. Marchand's measurements indicated an average diameter for the dust particles of from 20 to 30 microns shortly after the passage of the comet's tail through our atmosphere. Since that time the size of the particles has decreased to about 0.5 micron.

Easter Island, lying 2,000 miles west of the South American coast, in the South Pacific Ocean, has been, ever since its discovery by Europeans, a most interesting archæological puzzle on account of its colossal stone statues, ruined stone houses, and other remains of an unknown race. *Petermanns Mitteilungen* reports that a fresh attempt to solve the mystery of these remains has been undertaken by an English sportsman, W. Scoresby Routledge, who is proceeding to the island on a motor yacht, accompanied by a geologist and an archæologist from the British Museum.

Topographic Maps of Counties.—The well-known Topographic Atlas sheets of the U. S. Geological Survey, which will ultimately cover the whole of the United States, divide the country into regular "quadrangles" having no relation to political boundaries. As there is, however, a demand for county maps of the same general character, the Survey has begun experimentally to issue such maps. The first of the series, recently published, is of Jefferson County, Kentucky. The area was surveyed in co-operation with the Geological Survey of Kentucky. The county is very irregular in shape, and includes parts of the areas shown on six "quadrangle" sheets of the Topographic Atlas.

Magnesia Rods as a Substitute for Platinum Wire in the Chemical Laboratory.—The increase in the cost of platinum has forced the chemist to look for a cheaper substitute. E. Wedekind, in *Berichte der Deutschen Chemischen Gesellschaft*, points to the fact that the magnesia rods used by the manufacturers to support incandescent mantles may be used for many purposes in the laboratory where platinum wire is used and others where the latter can not be employed. These rods are made of a magnesia composition, having great resistance to heat, and have a length of 15 cm. (6 inches) and a width of 1 mm. (0.04 inch). For use, these rods are fastened to a cork, which fits in a test tube. They can thus be kept for an indefinite period and are always ready for use. They are especially valuable for flame tests, borax and phosphate pearls, fusing, evaporating of volatile substances, and other demonstration purposes.

The Mile-a-Minute Boat

IT seems the irony of fate that we should have had to relinquish the Harmsworth trophy for the speediest boat of the year just two days before one of our own boats established a world's record for speed, raising that record close to the mile-a-minute mark. However, even had the "Tech, Jr.," been able to compete in the international contest, it is not at all certain that she would have won the trophy for the reason that it was reliability rather than speed that gave the cup to the "Maple Leaf IV." Her best speed was exceeded by other boats which, however, failed to maintain their good showing throughout the races.

The "Tech, Jr.," owned by Col. T. Coleman du Pont, is a small hydroplane, 20 feet long, equipped with a 50 horse-power engine. In the contest for the Bosch trophy for the world's one-mile championship, held on Friday, September 6th, she made the first nautical mile in 1 minute 11 1/5 seconds. This is equivalent to 50.56 knots or 58.23 statute miles per hour. This was the best mile made by the boat, and the record was made on a rougher sea than was encountered during the race. The time for the other five miles was, respectively, 2:08 1/5, 1:40 1/5, 1:36 4/5, 1:31 3/5, and 2:38 4/5, making an average of 33.39 knots, or 38.46 statute miles per hour. Her speed thus fell to a low figure over a longer distance.

The other contestant of the trophy was the "Baby Reliance III," whose best mile was done in 1:24, or 42.45 knots, and her average was 30.98 knots, or 35.68 statute miles.

Our photograph shows the "Tech, Jr.," being driven at full speed over the course. Her planes have raised the fore part of the hull clear of the water, showing the rudder, which is placed well forward, lifted well above the water.

Running over the water at 58 miles per hour.

Light Made Audible

By P. F. Mottelay (London)

THE interest which was widely displayed in Mr. Fournier d'Albe's new invention at the time the original model was first submitted to members of the Royal Society in London, some months ago, has been intensified by the exhibition recently made of the improved apparatus at the optical convention in South Kensington.

The new apparatus actually enables the totally blind, among other results, to locate accurately any window or open bright light, to discover readily the shadows of objects passing between them and the light, to discover variations in light such as are produced by clouds passing over the sun, and to locate brightly illuminated objects, such as, for instance, people dressed in white.

The action of the instrument is based upon the peculiar property of selenium of changing its electrical conductivity under the influence of light. This property is utilized for producing an electric current, which is interrupted by a special clockwork interrupter, and so made audible in a telephone. Thus the eye is replaced by the ear as a detector of light.

The improved instrument is a differential one, and as shown in accompanying diagram, contains two sensitive selenium surfaces, which form two of the resistances. It is specially designed to indicate contrasts, and is, therefore, best adapted for discovering objects, independently of the intensity of the light, though the brightest light naturally gives the quickest and most certain indications.

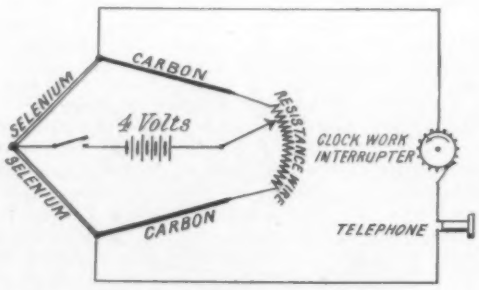
It consists of the camera-like box, ten inches long, three inches wide and four inches deep. To work it, it is necessary only to attach the telephone to one ear by means of the head-band, which latter should be slipped over the top of the head so as to hold firmly and enable the hands to remain free. The clockwork is then wound up by means of a small handle and a rod is moved along the slit until a purring sound is heard in the telephone. When this is the case, the iris diaphragm is closed down to its smallest size and the optophone is pointed (as one would a camera) toward some region of the open sky—though not to the sun, of course. The rod which controls the wire resistance should thereupon be moved until the purring becomes as faint as possible; should, however, absolute silence not be obtained in this way, the sliding lid must be opened and the carbon resistance adjusted until perfect silence is procured. The instrument is now in its most sensitive state. The passage of the hand or other object across the aperture is indicated by a purring sound, the loudest sound indicating the passage of the edges, where the contrast is greatest. The full effect takes a few seconds to develop, and slow movements are, therefore, more easily discovered than rapid ones. In a bright light, however, even the swiftest shadow is discoverable. Prolonged exposure to a bright light "blinds" the optophone just as it blinds the human eye, and some repose is required to let it regain its sensitiveness for faint light. In feeble light, the iris diaphragm should be open to its widest extent. A gentleman who tried the optophone found that a glimpse out of the window sounded like a cinematograph reeling off a film. The ticking sank almost into silence as the receiving tube was held in the shadow of the table, and leaped into a lively rattle when placed against an electric light bulb.

If you are blindfolded and place the receivers to your ears, and a piece of blotting paper is placed between the box and an incandescent lamp, you hear a ticking or grating sound; in fact, you hear the shadow passing.

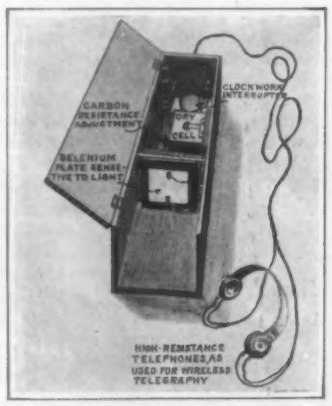
On a moonlight night you hear the moon, while the summer sun makes a tremendous noise like a cataract.

The optophone can locate the light of stars invisible through the telescope.

The telephones used are similar to those employed for wireless telegraphy, and are capable of detecting a current of a quarter of a micro-ampere when interrupted by clockwork. The carbon resistances are 1,000 to 2,000 ohms each. In the new differential optophone, two selenium cells are balanced against two carbon resistances in a Wheatsone bridge arrangement. When directed toward any uniformly lighted surface, whether bright or dark, there is silence; but when the image of the edge of a bright object falls upon the line dividing the two selenium cells, one of the latter is illuminated while the other is in darkness, and the contrast thus secured gives a striking indication of the whereabouts of the edge. This is what the stone-blind want—to find where an object begins or leaves off.



Principle of the optophone.



Interior of the optophone, showing arrangement of parts.

Mr. E. Fournier d'Albe with his optophone.

The Mahagua Tree as a Source of Fiber

THE mallow family (*Malvaceae*) to which the common cotton plant belongs, includes a large number of trees and shrubs yielding valuable bast fiber. Mahagua or mahoe (*Paritium tiliaceum* Ad. Juss.) is perhaps the most important member of this group. All the species of the genus *Paritium*, of which there are over twenty, yield fiber for cordage and other purposes. While all of them produce a valuable fiber the majority are of local use only, and the mahagua is the only one that is available in sufficient quantities to be worthy of the attention of the large trade. It furnishes a strong and flexible fiber comparable to jute, and has the remarkable quality of becoming stronger by long maceration in water.

The mahagua is a shrub or sometimes a rather large tree widely distributed, and is very common in all tropical countries, where it has been planted and escaped and now grows wild. It is a native of the West Indies and grows abundantly there. The tree was introduced into India very early and now is common on the Malabar coast, and is called *bola* by the Bengalese. It is also common both in East and West Africa, where it is cultivated in a good many gardens, because it is regarded as a very desirable shade tree. It is believed to have been cultivated for its fiber in tropical America before Columbus discovered the Western Continent.

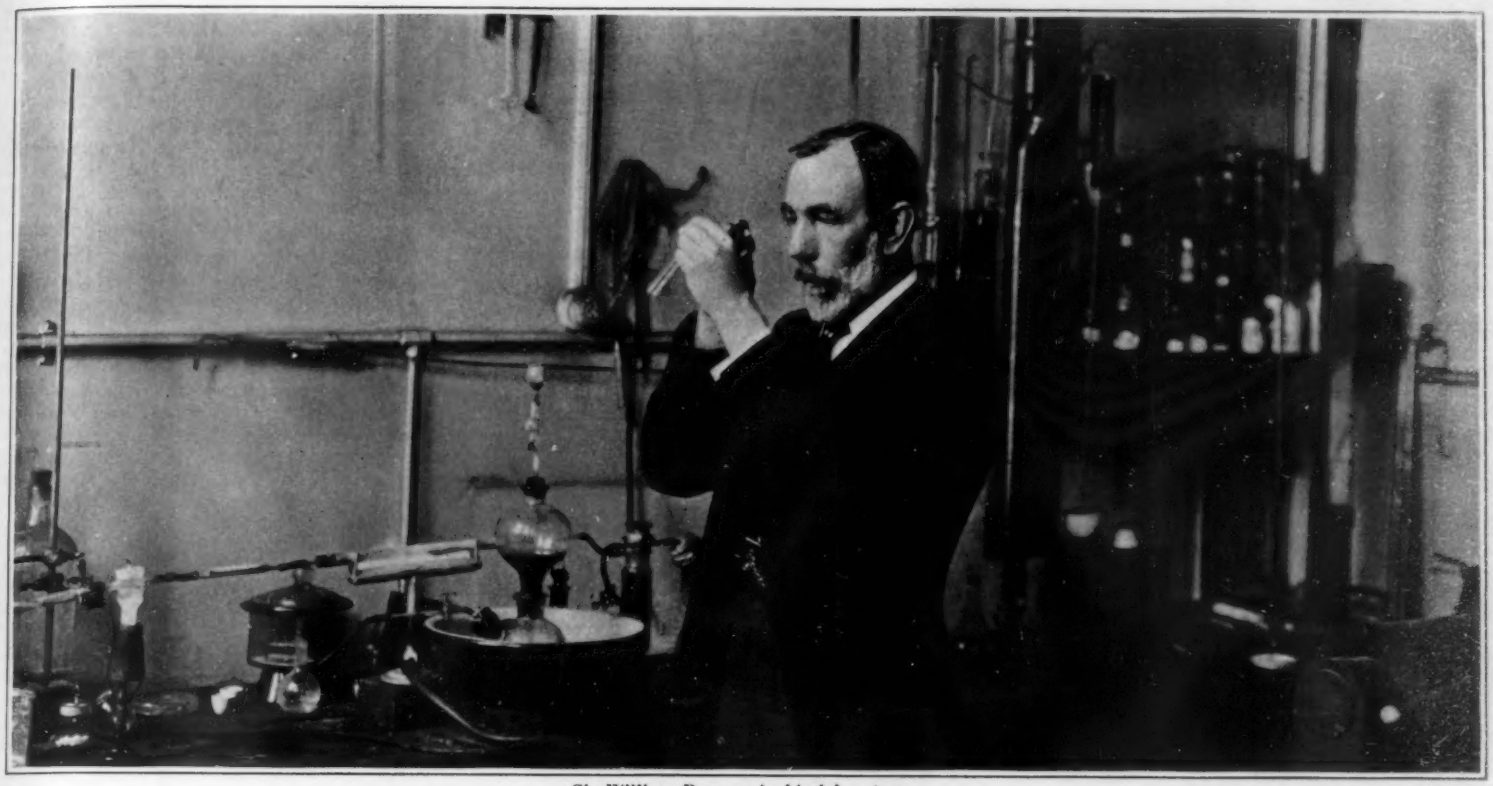
Considerable quantities of this fiber have lately been exported from parts of India to England and the United States, where its use is constantly increasing. In India it has long been used to adulterate jute and hemp, which it resembles, and has been imported into France for use in the manufacture of high-grade paper. The fiber is white or grayish yellow, fine, silky, strong, pliant, slightly lustrous and somewhat lignified. The average length of the fiber is about five millimeters and about 16 micra in diameter. The walls are strongly thickened and the cell cavities are very small. According to Roxburgh the breaking strength is greater than that of the fibers of a majority of other textile plants. The mahagua fiber possesses unusual durability, which is a point of great importance. It is readily separated and the work of preparing it is less tedious than applies to the other fiber-yielding plants of this genus. It is well adapted for making rope, twine, sacking, mats, and is highly suitable for the paper trade and immense quantities of it might be gathered and brought into the United States. The bark is sometimes called Cuban-bast, and at one time was used for tying bundles of the genuine Havana cigars, but afterward imported as a substitute for the Russian bast used by the gardeners for tying up plants. It has also been used in making cigarette wrappers, and it is employed in many regions for making fishing nets.

In Nicaragua and in many other parts of Central America mahagua fiber is very abundant. It is used by the native store-keeper of the interior, instead of twine. The Indians and the native ranchmen use it for making lassos, halters, and ropes and wherever strength and durability are required. The majority of boatmen depend upon it for making their tie-lines and anchor ropes. The only expense incurred is the time required for making the ropes, while imported ropes are too expensive for the average boatman to buy.

The mahagua is found also on all the principal islands of the South Sea. In Guam the inhabitants utilize it also for making rope. Nearly every family is provided with rope-making appliances. The ropes are used chiefly for halters and lines for tethering cattle and caraboes, for harnesses and for cables for ferrying rafts across streams. The strength and durability of the ropes are much increased by tarring. The natives of the Caroline Islands split the inner bark into narrow strips, which they weave into breech-cloths or aprons worn by the women. In the Fiji Islands the bark is prepared by steeping it in water to render it soft and pliable. It is then made into women's "liku," a dress consisting of a number of fringes attached to a waist band.

Heated Steering Wheels

EVERY motorist knows how uncomfortable his hands are in a biting blizzard, or even on a still, but very cold day. To make life more agreeable an inventive genius has patented a hollow steering wheel, into which exhaust gases from the motor are conducted by means of a small pipe running parallel to the steering column. In the case of electrics, the hollow rim is filled with electric "heaters."



Sir William Ramsay in his laboratory.

Sir William believes it will be feasible to generate gas directly in mines that can no longer be worked profitably.

Gas-Power Direct from the Coal Pit

An Interview With Sir William Ramsay

By Paul F. Mottelay, London

At the recent Smoke Abatement Exhibition at Agricultural Hall, London, Sir William Ramsay made the first public reference to his projected power scheme. If, as many believe, his views can be effectively carried out, coal miners will find their services are no longer needed, or at least the demand for them will be much reduced.

Sir William remarked that he had for many years been working with gases of all descriptions, in large and small quantities, and had managed to deal with such a very small portion that it would not fill one half a hollowed needle. There is, he says, nothing so easily managed as a gas. Although it cannot be seen, its presence is always evident: it can be made to stream through a pipe at any desired rate and, when received, it can be handled as required.

Knowing that in the mining of salt, water is put down to the rock-salt where it remains until the rock is dissolved, when it is pumped up in the form of brine, he thought that possibly the simplest way to secure at much less cost all present heating facilities would be to cease burning coal altogether. This he proposes to do in a novel manner, which, if thoroughly successful, would enable us to do away, among other things, both with coal mining and with coal smoke. He does not see why our gas retorts should not be in the bowels of the earth, where the coal could be readily converted into gas, in lieu of going through the prevailing difficult work and enormous expense incident to raising the coal to the surface for the purpose of there obtaining the very same product. The latter could then, of course, be employed in any manner desired, especially in gas engines, which are the most economical of power producers, giving, as they do, an efficiency of thirty per cent as against an efficiency of less than fifteen per cent from the average steam engine. Electricity could, even at the pit-head, be generated by the gas engine and conveyed under high tension to very long distances.

Sir William Ramsay has completed arrangements with a prominent colliery proprietor which will enable him at an early date to carry out all necessary experiments to prove his contentions. The advantages he claims are:

Electric power for railways and industries at one fifth, and possibly one tenth its present cost.

"If only one tenth of the amount of coal is used by the means proposed, you would multiply by ten the years of life left to the coal field. All the supplies of coal that are at present worthless could be brought into use. A seam must now be two and a half or three feet wide before it can be worked. In the new era it might be under a foot thick, and a half shale, neither worth mining nor worth having even if it were mined. There are plenty of worthless seams where there is no population. There may be of course unforseen difficulties. There are always difficulties, but I hope soon to prove the value of the experiment."—Sir William Ramsay.

One of the exhibits at a recent London exhibition that drove home to Englishmen how much power and fuel they waste by tolerating their murky, smoky atmosphere.

The consequent electrification of the railways and the supply of electric power, instead of coal, to factories.

Domestic lighting and heating at a fraction of their present cost.

Such a saving of fuel as will prolong the life of the coal fields almost indefinitely.

And, a saving of man—for, in place of miners, the workers who will be most needed will be skilled mechanics.

In a recent interview, Sir William said that his intended experiments are likely to cover a period of several months. They will be made with a practically worthless stratum of coal, located as near surface as possible to lessen expense. To reach this stratum a bore-hole will be made, which need be only a foot and a half diameter through which a tube, about six inches in diameter, will be put down to keep it free from water. As this tube descends it will naturally reveal the exact nature of the various strata. "Thus, there will be no expensive shaft to sink, no tunnels to drive, no rubbish to remove. Inside this tube, you could insert two smaller pipes, one inside the other, the smaller of the two for the purpose of pumping out the water, and the other for passing down air, steam or small quantities of water to burn with the coal—there is nothing new in that. The coal, of course, would be easily ignited, in the first instance by passing down an electric wire which would then be withdrawn. Your gas engines would enable you to utilize thirty per cent of the fuel value of the coal. In other words you double your yield of energy. Transmission from the pit's mouth through high tension cables need present no difficulties. In California they have sent it two hundred miles, and there is no reason why it should not be sent very much farther. Any coal that is too bad to be worth mining could be utilized in this way; it could be made to burn where it lies. At first, of course, you may find coal owners objecting to setting their coal mines on fire. Also, it may be objected that, as the coal is burned out this ground will sink. So it will, but this already happens in the salt districts, and nobody minds it much; it happens gradually, and people just accept it. The existing coal mines, I should say, would be kept open as a sort of reserve. The change is bound to be gradual. And for steamships, naturally, the electricity from the pits would be useless; they will always need coal or some other form of fuel."

When asked if the producer-gases to be brought up from the coal strata by the above-named process could be utilized for any other purpose than working gas engines, Sir Wili-

iam said: "It is a question of cost. You cannot convey this gas very far owing to the expense of piping. If it could be used at a reasonable distance, perhaps ten miles, it might pay to put down piping. The cheapest thing to do, however, would be to convert the gas into electric power and distribute electric current. By means of the high tension current I spoke of, the cost of electric power would be reduced to about one tenth of a penny a unit, compared with a penny a unit that is now the price for power, and with fourpence a unit that is the price for light. Here then would be the means of electrifying all the railways at once, and of supplying power to all the factories. This would be a start. It is not possible to say at this moment what you might not do besides. As soon as it was shown that power could be purchased at one tenth, or suppose we say only one fifth the cost that it is at the present time, I feel that railway companies, factory owners and others would have no hesitation in using it. Indeed, they would be bound to do so. Another enormous advantage of this conversion of coal into gas and electricity would be the saving in fuel. I made a statement some time ago that in one hundred and seventy-five years, the coal supply of Great Britain will be exhausted. Mr. McKenna has challenged this statement, remarking that it did not take account of the reserves. These reserves, however, are very questionable, and I replied at the time that supposing they were taken into account it would only give the coal fields a duration of some two hundred and fifty years. In this connection I may add that, instead of the blazing fire on the domestic hearth and in place of the present rather costly system of heating rooms by gas or the existing apparatus for electric fires, the novel and possible alternative of obtaining heat by means of wires through the carpet would be practicable. Get your carpet at a temperature of seventy degrees and your room will be quite comfortable."

A very interesting object lesson as to the wastefulness of our present methods is afforded by the accompanying illustration. The square black pillar, which represents London's annual average soot fall is standing beside a comparative model of the Westminster Clock Tower, and the very small white monument back of the potted plant represents the Cleopatra's Needle on the Thames embankment.

While it would be entirely premature to make any positive statements at the present time either in favor of or against Sir William Ramsay's proposed method of coal mining, the project has in it something exceedingly alluring, and recalls in some respects the work of Frasch, which gave Louisiana a new industry, and well threatened to destroy the sulphur mining industry of Sicily.

Cultivation of the True Cinnamon

THE aromatic spice called cinnamon is the inner bark of *Laurus cinnamomum* Linn., a beautiful tree attaining the size and approaching the appearance of our pear tree. The small, smooth and shiny branches, or young shoots, from the stump alone are available. The leaves are exceedingly variable, and in this respect remind one of our native sassafras, to which the cinnamon tree is very closely related. To produce the commercial bark the trees are allowed to grow for from five to seven years, when they are felled and the stumps allowed to produce young shoots called coppice. The same methods are followed in the East Indies to grow straight and smooth shoots of cinnamon as the basket-willow grower adopts in this country. It is kept coppiced in order to induce the formation of long willowy shoots. A distance of three feet between each stool is allowed in setting out young cinnamon trees, a space of nine square feet being required for each stool to produce the greatest number of desirable shoots. The cinnamon plantation may be regarded as a young forest with a short rotation period and not as a garden, which is regularly cultivated. The cinnamon plantation continues to yield abundantly crop after crop for many years. A good many of the plantations in Ceylon that are now regularly yielding cinnamon were started by the Dutch a hundred years ago and are quite likely to yield crops for a hundred years to come.

The cinnamon is cultivated in about every part of the East Indies, but it flourishes most profitably and is found most plentifully in Ceylon in the silicious soil with an admixture of vegetable mold. It is said to be a native also of the Malabar Coast, and has been introduced into Java, Reunion, the Cape Verde Islands, Brazil, the West Indies and Uganda in East Africa. In Ceylon it produces the sweet taste, aromatic smell, and the pale brown or russet color, which renders the bark so valuable as an article of commerce and useful as a spice. Cinnamon bark from plants, even of the genuine kind, when grown in low marshy ground, subject to inundations, loses its characteristic properties. The cinnamon plant requires a certain amount of soil moisture for the full development of the spice, but stagnant water injures its flavor. The whole of the Ceylon coast is sandy and moist, and is generally favorable for the growth of cinnamon, which flourishes best in a hot and damp climate such as is there found.

When the young cinnamon shoots are ready to be cut off, the Cingalese laborers, called Chalias, provide themselves with sharp light bill-hooks and stout cord with which to tie up the sticks. By the middle of each day the cutters have sufficient shoots to occupy themselves in the barking process the remainder of the day. The bark is then slit open longitudinally on opposite sides with a curved sharp-pointed knife; on being carefully stripped off, it is laid aside to dry for about two days, when the epidermis is scraped off with a broad blunt knife about two and a half inches long. After the cuticle is removed the bark is assorted into three quality classes, according to thickness of bark and brightness of color; the short pieces of each kind are set aside, to be placed in the interior of the pipe, while the longer ones are placed outside. The piping or quilling then commences, the peeler so selecting the bark that very little cutting at the ends is required to form them into proper lengths. The quills are made into uniform lengths of three feet and a half, and three layers of the bark or quill, inside each other. Much of the value of the spice depends upon the proper grading in quality classes.

It is generally calculated that ten fairly productive stumps yield one pound of thoroughly dried bark, and that the shoots growing up from the stumps mature every two or three years. After the first crop of shoots is harvested a fresh supply of young shoots appears which grows very rapidly as soon as the wet season starts in. Those shoots which are considered fit for cutting are usually three fourths of an inch in diameter and from five to six feet or more long.

It is well known that the bark yields an essential oil, and from the leaves an oil is obtained which resembles clove oil, and is known in commerce under the name of "oil of cloves." From the root of old trees is extracted an excellent camphor, and the flowers are also used as a spice. The pulp of the berries is sometimes made into cakes.

Imports of Cinnamon, and Chips of, Unground, Entered for Consumption in the United States During Years Ended June 30th, 1900 to 1911.

Years Ended June 30.	Quantity. Pounds.	Value.
1900	418,374	$59,544
1901	483,992	77,685
1902	358,832	55,512
1903	641,214	92,646
1904	675,873	80,502
1905	621,948	78,425
1906	645,758	78,473
1907	777,597	106,827
1908	520,460	76,634
1909	1,022,846	93,856
1910	921,042	87,798
1911	1,147,428	100,640

How Nature Punishes the Parasite

A NATURALIST, observing the difficulty a butterfly has in breaking from its chrysalis, determined in the kindness of his heart—they are not all calloused, those men of science—gently to cut away certain impediments, so that it could the more easily free itself. The result? Instead of emerging strong and large and beautiful, it was a frail thing indeed, without strength in its body or beauty in its wings; the very struggle of which the scientist's mistaken kindness had relieved it, had contained and conditioned the source of its beauty and virility. Again: Ducklings helped from their shells differ from those which have to fight their way out, in being stunted weaklings—if they are not still-born, or die soon after the too-solicitous hand has helped them out of the shell-stage of their development.

Biology divulges many forms of life which will not take the trouble to find their own food, but prefer to borrow or steal it from the more industrious; this is oftentimes an acquired habit, and a most grievous, bad one, for which nature invariably exacts a dreadful penalty. The dodder begins life with excellent intentions, strikes its root deep in the soil, means evidently to be really independent. But after a brief period of dignified self-support, it comes to fix sucking disks into the stems and branches of adjacent plants, until finally it does nothing at all for its self-support, and instead draws all its supplies ready made from the sap (the life-blood) of its host. Having thus become a parasite, needing no organs of nutrition of its own, nature takes them away: and thus the adult dodder presents the miserable, degraded spectacle of a plant without a root, a twig or a leaf, and with a stem so frail as inadequately to bear its weight. In the mistletoe the parasitic habit has been hereditary through so many generations that the young forms begin at once an ignoble and dependent existence; the berries, which contain the seeds of the future plants, are developed to minister especially to this degeneration; for they glue themselves to the branches of neighboring oak and apple trees.

The ordinary crab should excite warmest admiration; and he has a "business end" to him which commands respect. He leads a rough and perilous life; jagged rocks are his habitat; and among these he is dashed about by every wave, while on every side his piscine enemies attack him. As a defense against such environment he has developed, by the aid of sympathetic nature (kind always to those who would help themselves), a strong and serviceable coat of mail. But not so that poor and needy relation, the hermit crab. The latter's progenitors long ago hit on the dubiously wise idea of re-utilizing the plenteous, well-built habitations that had been evacuated by other molluscs. The result of this house-free, purloining policy is that generation after generation this kind of crab, dwelling in its appropriated shell, has ceased to bother or concern itself about questions of safety. Wherefore Nature (as stern as she is just) has written this sin against evolution, this semi-parasitism, most plainly upon the hermit's organization, for the reading of all, to its shame. This apology for a crab has suffered in its anatomy precisely in proportion as it has borrowed or filched from its environment; it is now no more a lusty, perfect, commendable crab; its body has sadly deteriorated; several vital organs are partially or wholly atrophied; its sphere of life has become deplorably limited. Having by a cheap and unworthy expedient secured safety, it has in consequence fatally compromised its independence. Not now needing to construct its own coat of mail, a vital inducement to a life of dignified and vigilant exercise of its own powers is correspondingly withdrawn. A number of functions have struck work; consequently the whole organization has become enfeebled. By the stern law of evolution—that an unused organ must atrophy—the hermit has not only lost all power in certain parts, but also those parts themselves. Instead of the thick, chitinous shell of the self-respecting crab, the hermit can show only a thin and delicate membrane; this half-naked and woe-begone hobo of the seas presents certain of its limbs as rudimentary, or so small and wasted as to be but pitiful apologies for limbs. The only compensation for all this degeneracy is that such additional tail development as will permit it to hold on to its extemporized retreat, has been required.

Almost every animal is a living poor-house, harboring countless lazzaroni, supplying them gratis, not only with a permanent home, but with all the necessities, and indeed also all the 'uxuries of life. The animal is thus an unwilling host, to its own prodigious discomfort. It is a questionable philosophy of David Harum's, that "a moderate amount of fleas is good for a dog. It keeps him from broodin' on bein' a dog." The flea gets too much the better of the bargain.

Nature abounds in such examples as these of parasitism and semi-parasitism. And deductions are obvious: Effort is quite as essential for human well-being as for that of any animal. In the universal scheme the genus homo is conditioned as to his life processes, precisely as is every other creature in the cosmos. Man is perversely foolish to imagine the universe to be anthropocentric, and that he can afford to flaunt the "eternal verities." In the hands of Nature he is as helpless as any other sentient thing. Her laws of heredity, of environment, and of function govern him as inexorably as they do the dodder and the hermit crab. While vitiating their own stamina, the indolent and the selfish inflict a most grievous phlebotomy upon the virile and the self-respecting portions of the race. The charity which helps the individual to help himself is altogether laudable. But indiscriminate charity is a cruel wrong, both to the recipient and to his community. And is not this true also of paternalism? When will the body politic come to appreciate that what its government bestows upon one portion of its citizens must inevitably—there can be no other source—be abstracted (in the form of taxes) from the remainder of the people?

Experiments With an Aeroplane Gun

SOME interesting experiments were made at the Brasschaet military aeronautic grounds in Belgium with a mitrailleuse mounted on an aeroplane. The mitrailleuse is said to be of American invention, and is designed specially for this purpose. The object is to defend the aeroplane against attacks from the ground, and especially against other aeroplanes or airships. The gun is air-cooled and is of very light build, and it can fire as many as 500 shots per minute, each ball having 3,000 feet per second initial speed. It was a real problem as to how to mount the gun upon the aeroplane in the proper way, but this is now successfully done. A special suspension device allows the gun to be aimed in all directions, and means are provided so that the ejected shells will not endanger the helice. Other devices serve for the sighting and for compensating for the action of the wind and the like.

Correspondence

[The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.]

A Card Trick

To the Editor of the SCIENTIFIC AMERICAN:

Under the above heading on page 55 of your issue of July 20th is given a card trick called the "Hawaiian Islands," which depends upon the fact that cutting a pack of cards never alters the relative position of the cards provided that if necessary you regard the top card as following immediately after the bottom card in the pack. The following trick depends upon the same fact. Deal the cards of a pack face upward on the table, calling them 1, 2, 3, etc., as you put them down, and mentally noting the card first dealt. Ask some one to select a card which is being laid down, and recollect its number. Turn the pack over and let it be cut as often as the person likes. Ask the number of the card chosen. Then deal the cards one by one, and when you come to the original first card, count it silently as 1, and the selected card will appear at the number mentioned. If all the cards are dealt before reaching this number, turn the cards over and go on counting. H. S. ARNOLD.

New York.

Drain Pipes and Mosquitoes

To the Editor of the SCIENTIFIC AMERICAN:

The section in which I lived last year is practically immune from mosquitoes. Last summer, however, we were troubled considerably. The country is hilly and well drained. There are no swamps or other breeding places.

One evening just before dusk, while lying in a hammock, I noticed a swarm of mosquitoes around the coping of the house. I got a ladder and soon discovered the source of the mosquitoes. The gutter along the coping had sagged and the last rain had left considerable water in it, which was quite stagnant and full of wrigglers. We repaired the gutter and the mosquitoes disappeared.

It has occurred to me that you might like to have this information. C. S. K.

Philadelphia, Pa.

[The SCIENTIFIC AMERICAN has from time to time called attention to gutters and drains as breeding places for mosquitoes. So, too, the United States Department of Agriculture has issued popularly worded bulletins in which this information is conveyed. Although our correspondent has discovered a well-known fact for himself, it seems to us worth while to publish his communication since it may serve to assist others in ridding themselves of our summer insect pests.—EDITOR.[

The Aviettes

To the Editor of the SCIENTIFIC AMERICAN:

With reference to article on page 9, SCIENTIFIC AMERICAN of July 6th on the failure of the Aviettes, is it not a fact that bicycles being dependent for their driving effect on the friction between the road surface and their wheels like all other self-driven vehicles cannot be raised from the ground by any means except an aerial propellor, assuming it to be possible to fit such a propeller. As the planes tend to raise the bicycle and so reduce friction at the wheels, the bicycle would, it appears, necessarily stop immediately it began to feel the liftup effect produced by them.

It would interest me and several other people very much to hear your views on this matter.

Achnahaird, Ullapool, Ross, N. B. D. A. LAWSON.

[Our correspondent is right, if his supposed aviette runs constantly at an effective lifting angle, but if kept at zero lift, it would permit the wheel to have full grip on the ground until its full speed was acquired, whereupon the plane could be uptilted and suddenly have its maximum lift.—EDITOR.]

Wanted: A Small Gasoline Plow

To the Editor of the SCIENTIFIC AMERICAN:

It seems to me that inventors are slow in getting The Real Machine devised for the small farmer to supplant the two horses to do the work in pulling the various plows more economically and efficiently than two horses can do the same work.

I cannot delve deep in the matter of gasoline propelled vehicles, but possibly some suggestions I have to make would be of some value to a would-be inventor. A machine of this kind should be as compact as possible in order to make a turn in a given radius at least that of a mule. It should have rather high, wide-tired wheels with heavy gearing. The motor plant should be so installed that it will rest on spring cushions attached to frame, instead of being rigid to frame, thus obviating the necessity of cushion tires. Now if it is mechanically possible to couple the power plant to a differential gear, resting on a spring in the above manner, I cannot see why such a machine could not be made practical for the aforesaid purposes. Would be glad to read some comment on this.

Brewton, Ala. E. M. BLACKSHER.

Fastening Dress Shields Simply

To the Editor of the SCIENTIFIC AMERICAN:

In the issue of the SCIENTIFIC AMERICAN of June 29th, under "Notes for Inventors," request is made for some simple method of fastening dress shields to dresses. For a simple and effective method hooks and eyes will answer the purpose. Sew a hook at each end of shield and one at extreme edge of side of shield that rests against side of dress (at points where sewing or pinning would ordinarily be done). Attach to dress an eye to correspond to each hook. If small hooks and eyes are used they will be almost invisible. By fastening eyes to each dress the shields may be readily removed from one dress and placed in another.

Brooklyn, N. Y. J. A. G. HARTON.

The Rail Question

To the Editor of the SCIENTIFIC AMERICAN:

I presume you have seen in the daily papers that the 18-hour train of the Pennsylvania Railroad, which met with an accident on a straight track, going about 60 miles an hour, was not running faster than her usual rate of speed because she was on time. This may bring about a reduction in the running time of the 18-hour trains of both of the roads and I hope it will set the people to thinking that cold weather is not the only thing that causes accidents to these fast trains.

I have not seen as yet an official statement which gives the cause of the accident, nor will I draw any conclusion as to the probable cause. Attached to this letter you will find a list of accidents which happened to our fast trains during the month of December, 1911, and the months of January, February, and March, 1912, with the causes and the number killed and injured. I get my facts from the daily newspapers, those of good character only, the *New York Evening Post* being one, and correct these facts by the monthly statement of accidents issued by the *Railway Age-Gazette*. Mr. S. O. Dunn, as you know, is a careful man; the reports that are printed in his paper I believe are true and unbiased. This list that I have sent you is a copy from my book and if you take the time to examine it you will see that broken rails were not by a good deal the causes of all the wrecks or even some of the worst ones.

My firm belief is that the rail question needs attention more than this cry for reduction of speeds. A rail that is frozen will break, I believe, as well under a freight train as an 18-hour limited. It is known that our high carbon steel rails do first rate service on a freight road, such as the Buffalo, Rochester & Pittsburgh, but that on trunk lines where we have freight and high-speed passenger trains they are apt to get brittle with disastrous results. Not many people are aware of the fact that on a certain trunk road in the Middle West, because an engine was not properly balanced, 150 broken rails were removed the next morning on one side of the track after that engine with its fast train had passed over it in her run; or that on another trunk line a little farther north in a 100-mile stretch 200-odd broken rails were removed after a night's traffic had passed over it. These facts may illustrate how important the rail question is, not so much the speed question, though I think the State of Michigan was right when it prohibited the railroads in that State to run their trains faster than forty miles an hour during the winter and part of the spring months.

The next question in the speed reduction of our fast trains is, are our trains really fast? I have added to this list a list of fast trains which I have copied from *Railway and Locomotive Engineering*. While I will not vouch for its correctness, I have no doubt that Mr. Sinclair's paper which is first-class in every respect, will. If you look at the list you will find that fast American trains do not figure as prominently as they ought to. The European roads do not have as heavy trains as we do, nor is their equipment as strong as ours. But from all I hear I believe their tracks and roadbed are better than ours in a good many ways. Take, for instance, the London & North-Western, and the use of its steel chairs, two on each tie. Not many roads in this country use it, and I don't know of any unless it is possibly the Pennsylvania. None of the European roads to any great extent has steel equipment, and only one in this country has progressed to any great extent. I refer to the Pennsylvania, and to it should be given the credit of its introduction. As a matter of fact, that road is way ahead of the others anyhow.

The Interstate Commerce Commission was quite right when it took up last year the matter of safety devices and ordered that certain of these devices be used on the equipment, and let us hope that that same body will order the railroads soon to order steel equipment for its passengers. If the railroads will not voluntarily stop the killing of the passengers, then legislation must. The railroads are not all to blame. That same body mentioned above makes mistakes, but who has not? Labor organizations do not help in the reduction of accidents as they might and as they ought. In fact, I believe they help them. If I may quote James O. Fagan, in his "Confessions of a Signalman," he says that a division superintendent says, "*Within a week we could put a stop to these accidents.*" I believe Mr. Fagan is right. This accident question must and ought to be investigated properly, and the sooner the better for the public. CHARLES E. FISHER.

Taunton, Mass.

ACCIDENTS TO FAST TRAINS IN UNITED STATES DURING DECEMBER, 1911, AND JANUARY, FEBRUARY AND MARCH, 1912.

December 18th, on the Chicago, Milwaukee and St. Paul, a rear-end collision near Odessa. The train was the all-steel "Columbian." It was found that the rear brakeman failed to go back and flag a following train. The construction of the cars also was criticised. Ten killed and twelve injured.

December 27th, on the C. C. C. & St. L. (New York Central Lines) the "Twentieth Century Limited" was derailed near Lagrange, Ohio. Fifteen were injured. Broken rail the cause.

December 28th, on the Chesapeake & Ohio, the "Fast Flying Virginian" was derailed near McKendars. Two were killed and five injured. Broken rail the cause.

December 30th, on the Great Northern, the "Oregonian" was derailed near Finley. Six were killed and thirteen injured. Broken rail the cause.

January 9th, on the L. S. & M. S. (New York Central Lines), the "Knickerbocker Special" was wrecked near Dunkirk, N. Y. Three were injured. Engineer of special could not see signals in a snow storm, ran by and hit another engine.

January 12th, on the L. S. & M. S. (New York Central Lines), the "Twentieth Century Limited" collided head-on with an empty train of the C. & E. I. R. R. at Chicago. Ten were injured. Engineer of C. & E. I. train failed to obey signals.

January 19th, on the New York Central & Hudson River, "Fast Mail, No 3," was derailed near Crittenden, N. Y. Two were injured. Caused by a drawbar pulling out of a car and derailing that same car.

January 19th, on the New York Central & Hudson River, "Fast Mail, No. 3," collided with a string of empty mail cars when backing into the station at Buffalo, N. Y. Twenty-two people were injured. Caused by a misplaced switch.

January 22nd, on the Illinois Central, the "Panama Limited" smashed into the rear end of train No. 25. Four were killed and three injured. The blame was placed on the crew of No. 25 for not going back and flagging the Limited, and also on the engineer of the Limited for not approaching Kinmundy, where the accident took place, at a slow rate of speed, where he knew No. 25 stopped to take water.

February 14th, on the Great Northern, the "Oriental Limited" was derailed near Doyon. Forty-one were injured. Spreading rails caused the accident.

February 15th, on the Pennsylvania, the "Pennsylvania Limited" was derailed at Warrior's Ridge. Five were killed and sixty-five injured. Caused by the breaking of the equalizer bar on the first engine, which derailed the train.

February 17th, on the Pennsylvania Lines, the "Pennsylvania Limited" collided into the rear end of a work train near Larwill, Ind. Four were killed and twelve injured. Due to high speed through a dense fog.

February 20th, on the Pennsylvania, the "Pennsylvania Special" (18-hour train) hit a switching engine in the Harrisburg yards. Two were injured. Caused by a brakeman throwing the switch and letting the switching engine run ahead of the "Special."

March 4th, on the Pennsylvania Lines, the "Pennsylvania Special" (18-hour train) was derailed near Bucyrus, Ohio. No one was injured. Caused by the breaking of the wheel on the tender of the second engine.

March 7th, on the L. S. & M. S. (New York Central Lines), the "Twentieth Century Limited" was derailed near Cleveland. One was killed and nineteen injured. Caused by a wheel breaking on a sleeper.

March 7th, on the C. C. C. & St. L. (New York Central Lines), the "New York Central Limited" was derailed near Bellefontaine, Ohio. Two were hurt. Some one allowed a box car to block the Plum Valley Street Crossing and the train was derailed, cutting the box car in two.

March 13th, on the New York Central & Hudson River, the "Twentieth Century Limited" was derailed near Poughkeepsie, N. Y. Twenty-three were injured. Caused by a broken rail.

March 13th, on the C. C. C. & St. L. (New York Central Lines), the "New York Central Limited" struck a freight train near Greencastle, Ind. Three were killed and eighteen injured. Caused by the signalman reporting a clear track when it was blocked by a freight.

In the above list the numbers reported killed and injured include employees and passengers. Persons killed and those who are seriously enough injured to die within 24 hours after the accident are reported killed. Persons injured to require medical attention are reported injured.

Fastest Long-distance Trains.

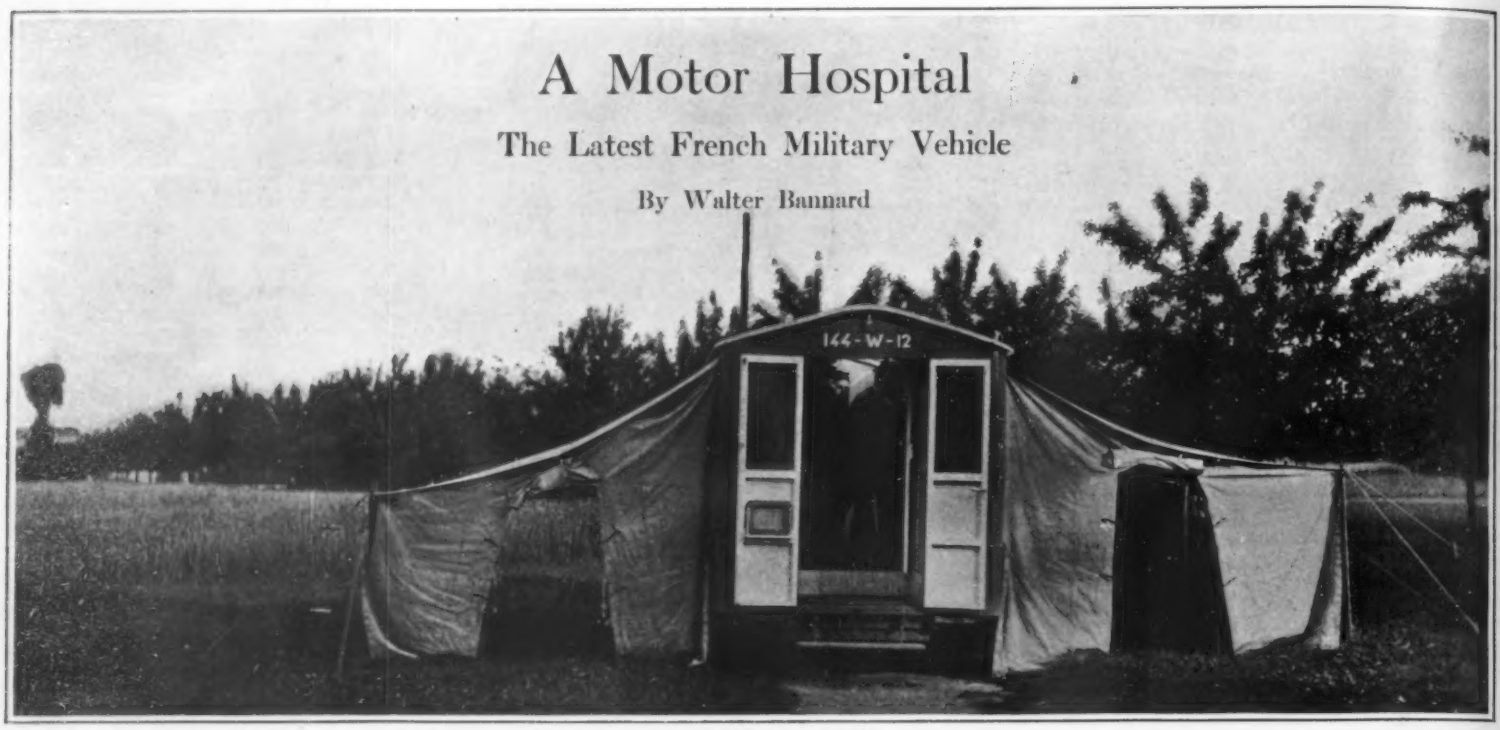
Railway.	From.	To.	Miles.	Speed, miles per hour.
Northern (France)	Paris	Calais	185.1	59.72
Prussian	Berlin	Hamburg	177.69	52.51
London & North-West.	London	Edinburgh	393.5	50.77
N.Y.C. & L.S. & M.S.	New York	Chicago	962.49	50.66
Caledonian	London	Edinburgh	401.5	50.18
P.L. & M. (France)	Paris	Mentone	687.5	49.10
Pennsylvania	New York	Chicago	897.0	47.21
Orleans (France)	Paris	Bayonne	488.0	49.3
N.Y.C. & H.R.	New York	Buffalo	440.0	49.3
O. & S. (France)	Paris	Madrid	903.0	38.49
Various	Ostend	Vienna	822.0	37.85

Copied from the June, 1912, *Railway and Locomotive Engineering.*

A Motor Hospital

The Latest French Military Vehicle

By Walter Bannard



THE maneuvers of the sanitary department of the military government of Paris, which take place annually at the Gravelle camp, were unusually interesting this year. The exercises included the establishment of a rescue service by automobile, a relay ambulance service and a temporary hospital, in addition to curious experiments in training dogs to search for wounded men. The most striking characteristic of these maneuvers was the extensive employment of automobiles for the expeditious rescue of the wounded.

The most remarkable specimen of the new equipment is an automobile operating room, in which surgical operations can be performed at the battle-front in conditions as favorable as those afforded by a hospital. Severe abdominal wounds, which are very common in modern warfare, cannot be operated upon properly by the ordinary field service, and in many cases the removal of the patient is equivalent to a sentence of death.

The new vehicle, which has a 40 horsepower motor capable of developing an average speed of 20 miles per hour, is furnished with all of the accessories and the latest improvements of a hospital operating room. Its principal compartment, the operating room proper, contains an improved operating table and a wash basin supplied with sterilized water. In front is a smaller compartment, containing the sterilizing apparatus and the electrical apparatus, which is operated by the motor, whether the vehicle is in motion or at rest.

A very ingenious arrangement enables the surgeon to locate the bullet accurately by the application of Roentgen rays. The operator, shielded from diffuse light by a photograper's hood, moves the fluorescent screen over the patient's body until the shadow of the bullet falls on a small hole at the center of the screen. By inserting a pencil in this hole the position of the shadow is marked on a sheet of translucent paper, ruled in squares, which is placed under the screen. The angle of observation is then altered slightly and the new position of the projection of the bullet is marked in the same way on the ruled paper. From the distance between the two marks, the depth of the bullet can be obtained, by referring to a table computed in advance.

The operating room of the motor hospital contains operating table, trepanning apparatus and sterilizing basin.

The operating room also contains a complete trepanning apparatus, which is operated by a special motor.

The vehicle carries an apparatus for sterilizing water by ultra-violet rays, for the use of the troops. The water is drawn from any convenient brook or pond by an electric pump.

A folding tent, for the shelter of patients before and after operation, is attached to each side of the vehicle.

The employment of automobile operating rooms of this sort would save many lives. In the recent war in Manchuria the mortality among the severely wounded was 90 per cent, because of the inadequate facilities for prompt operatory treatment. This mortality could probably be diminished by two thirds by the use of automobile operating rooms in which operations could be performed in perfectly aseptic conditions, without loss of time, before the removal of the patient from the field.

Showing the method of suspending stretchers in a military hospital vehicle, and the positions of the patients.

The motor hospital, besides its operating and sterilizing equipment, carries a shelter tent on each side, ready for pitching.

The James Gordon Bennett Aviation Contest of 1912

How Vedrines Won

By Our Staff Correspondent

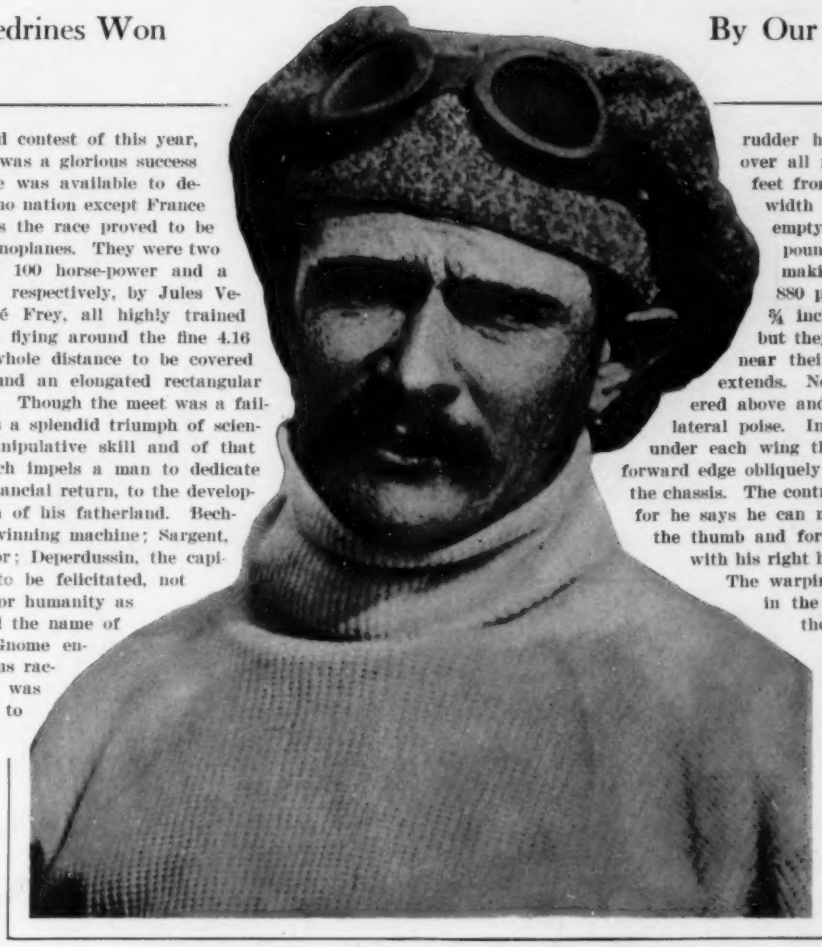
THE international aeroplane speed contest of this year, though a failure in one respect, was a glorious success in another. No American aeroplane was available to defend the Bennett Aviation Cup, and no nation except France attempted to take it from us. Thus the race proved to be a friendly rivalry between French monoplanes. They were two Deperdussin machines of 140 and 100 horse-power and a Hanriot of 100 horse-power, piloted, respectively, by Jules Vedrines, Maurice Prevost, and André Frey, all highly trained aviators who did their most skillful flying around the fine 4.16 mile course. In exact figures the whole distance to be covered was 124.8 miles in thirty laps around an elongated rectangular course terminated by hexagonal ends. Though the meet was a failure for lack of representation it was a splendid triumph of scientific design and construction, of manipulative skill and of that highly honorable sportsmanship which impels a man to dedicate his fortune, with scant promise of financial return, to the development of a noble art and the renown of his fatherland. Bechereau, the scientific designer of the winning machine; Sargent, the constructor; Vedrines, the aviator; Deperdussin, the capitalist and initiative spirit, all are to be felicitated, not only as conquerors for France, but for humanity as well. And to this list must be added the name of Seguin brothers, whose wonderful Gnome engine is a vital part of those marvelous racers. As a mere spectacle the contest was worth journeying a thousand miles to see. The day was cloudless and hot, but relieved by a fair breeze. Owing to the heat on the vast meadowland, and the numerous trees in the interior of the circuit, the air was filled with eddies enough to keep the racing pilots constantly alert and afford palpable evidence of their skill. There was frequent tossing and rocking of the aeroplanes, too often requiring a liberal margin in rounding the pylons, but these effects seemed instantaneous; for a machine moving 150 feet per second has little time to be disturbed in crossing the average hump or airhole. Usually the flight seemed like that of a projectile, or, as was aptly said, like that of a winged cannon moving breech foremost swiftly along its level course through the air. The turns through 60 degrees at each pylon were made with marvelous suddenness. The flyer would shoot like an arrow straight for the turning point, bank suddenly round the pylon, recover its level instantly, without rocking, then shoot in rectilinear flight again, but a few yards above the earth. When a lumbering biplane plodded overhead, it seemed to stand still as the real racers shot beneath, gaining on it more than sixty miles an hour.

As no accident impeded Vedrines in his official flight, he was easily the winner as anticipated. Prevost came second, as expected, and Frey third. But Frey stopped on the 24th round because of motor trouble. The official record gives Vedrines' average speed for the entire course as 105.5 miles an hour, Prevost's as 100.05 miles an hour, Frey's over 23 laps, or 94.3 miles, as 98 miles an hour. Vedrines fell a trifle short of his previous record of 106 miles per hour, while Prevost made a new record for a 100 horse-power monoplane. But both show marked improvement in last year's cup race record of 78 miles per hour. At the end of the race Vedrines flew three times around the course, a distance of 12.48 miles, in 6 minutes 55.95 seconds, making a new world's speed record for 20 kilometers. The official time for each lap shows that the air-cooled, fourteen-cylinder Gnome engines maintained their power with great regularity.

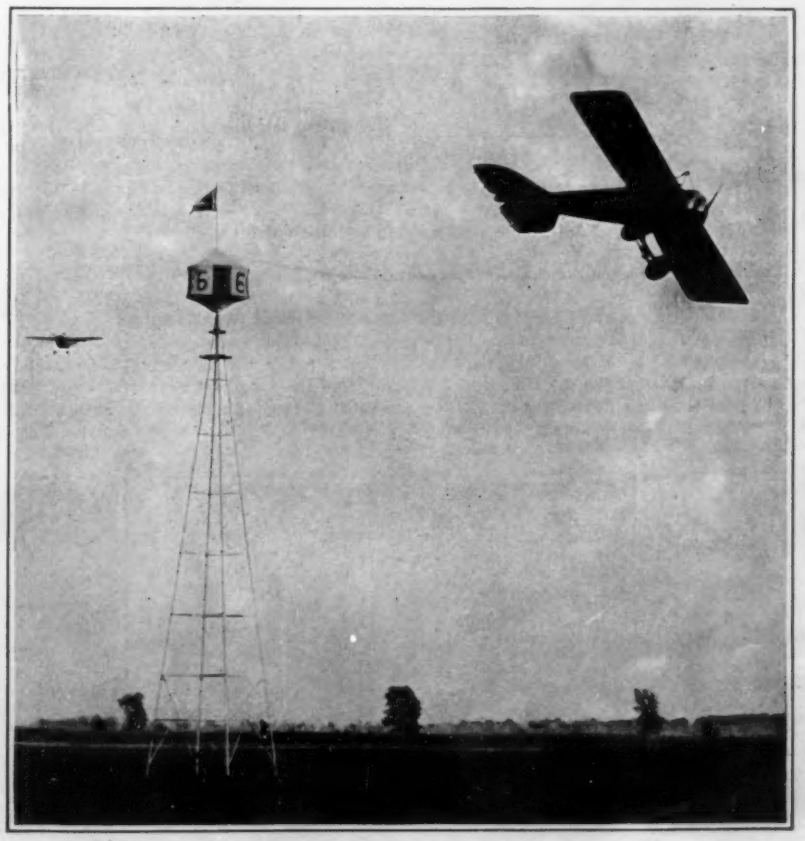
The 140 horse-power Deperdussin monoplane driven to victory by Vedrines is a marvel of compactness, strength and efficiency of form. It has a fish-shaped body or fuselage with a tractor screw in front, a cock-pit just back of the wings, and in the rear a movable horizontal rudder hinged to a fixed concave one for lifting, as also a movable vertical rudder hinged to a fixed vane. The machine over all measures 21 feet fore and aft, by 19½ feet from tip to tip of its wings, whose average width is about 5 feet. It weighs 710 pounds empty, and in the official race carried 117 pounds of gasolene, 6½ gallons of castor oil, making its total weight without pilot about 880 pounds. The wings are cambered about ¾ inch, which makes them seem flat below; but they are quite convex above, being thickest near their forward edge, where the front spar extends. Needless to add that they are tautly covered above and below, and are warped to govern the lateral poise. In addition to the usual four stay wires under each wing there is a fifth running from the outer forward edge obliquely inward and rearward to attachment at the chassis. The controls are the especial delight of Vedrines; for he says he can maintain his flyer in perfect poise with the thumb and fore-finger of his left hand while saluting with his right hand, and, in fact, throughout the course. The warping is effected by rotating a pilot wheel in the direction the machine is to be tilted; the horizontal rudder is operated by pushing the wheel fore and aft, thus moving the rocker arm on which it is mounted. To this rocker arm are attached the push rods which operate the horizontal rudder at the rear. Each warping wire, passing from the hub of the pilot wheel, thence along the rocker arm supporting it, runs down through the fuselage to the horizontal arm of a bell-crank lever pivoted on the lower part of the chassis. The other arm of the lever protrudes vertically downward some inches and at its lower end unites with the warping wire of the corresponding wing. When the wheel is rotated it accordingly turns these two bell-crank levers in opposite directions, thus causing the wings to warp oppositely. The steering rudder is worked by the feet actuating a horizontal rocker arm just above the floor of the chassis, the ends of the rocker arm being attached to the rudder wires. Thus the pilot seated on a cushion on the floor of the fuselage, his head just protruding above its ceiling, and the base of his skull resting against a special cushion, seems the picture of comfort, and the more so because of the wind shield just before the cock-pit.

The fish-shaped fuselage is of nearly circular cross-section at its front, near the revolving motor, but rearward it is of oval section. From the side it much resembles a headless fish with rather straight back and more curved ventral part. It was constructed of long poplar boards 5 inches wide by ⅛ inch thick, bent in layers spirally round a solid form, the grain of one layer running obliquely to the grain of its neighboring layer. When the whole is dried the form is withdrawn and a hole is cut for a cock-pit in the remaining shell. At the front of the shell, or fuselage, is placed the 14-cylinder revolving Gnome engine, surrounded with its oil shield. At the front of the motor is attached the screw propeller of 2.35 meters diameter by 3.15 meters pitch, bearing a coaxial convex circular wind shield which allows the air to rush directly against only the outer part of the revolving cylinders. Thus, the engine meets less resistance, and is more cooled than if the shield were omitted. Below the fuselage protrudes the frame of the chassis, and is united by elastic bands to the axle of the running gear. The two wheels are smoothly covered with sheet alu-

(Concluded on page 251.)



Jules Vedrines, who won the Gordon Bennett race in a one hundred and forty horse-power Deperdussin monoplane.

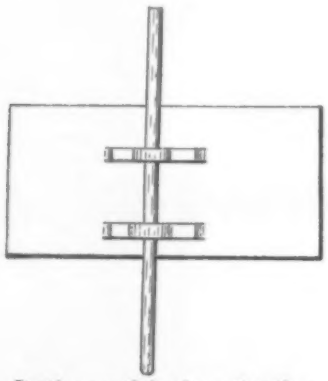


Vedrines rounding a pylon in the Gordon Bennett race. His average speed was 105.5 miles an hour for the course of 124.8 miles.

Simple Depth Gage

By J. A. Brearley

IN the SCIENTIFIC AMERICAN of February 4th, 1912, there is a cut of a depth gage designed by Mr. Clark. Herewith is a sketch of one which the writer has used for several years, and which is perhaps more simple and more quickly made than the one presented by him.



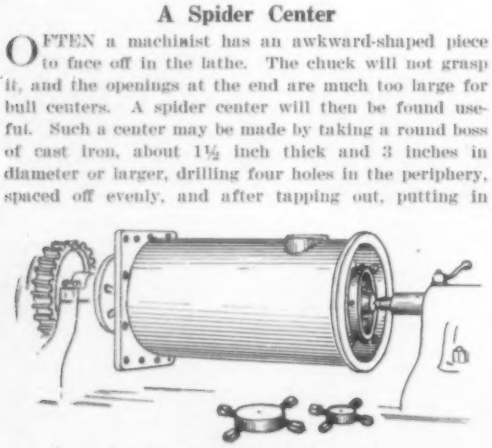
Depth gage of simple construction.

The rod is made of a piece of ⅛-inch drill rod, and the body of a thin piece of sheet steel. The straps through which the rod passes are made by cutting slits in the sheet forming the body of the gage, and for the rest the sketch is self explanatory.

The one in the writer's tool box was made in less than ten minutes of scraps such as may be found in any shop.

A Spider Center

OFTEN a machinist has an awkward-shaped piece to face off in the lathe. The chuck will not grasp it, and the openings at the end are much too large for bull centers. A spider center will then be found useful. Such a center may be made by taking a round boss of cast iron, about 1½ inch thick and 3 inches in diameter or larger, drilling four holes in the periphery, spaced off evenly, and after tapping out, putting in



A spider center for lathe work.

four set-screws. The boss has a countersunk center for receiving the lathe center when in use. The illustration shows the spider center in position. Larger sizes should be grooved out annularly on one face, giving room enough to reverse the set-screws, so that the points will project outward from the spider, which will allow more leeway for different sizes.

A Camera Support for Automobiles

By Frederick E. Ward

HARDLY anybody nowadays would think of going on an extended automobile tour without taking along a camera; but unfortunately the souvenir value of the pictures obtained is greatly lessened by the many unfavorable conditions under which the exposures have to be made. Chief among these is the lack of a suitable support for the camera.

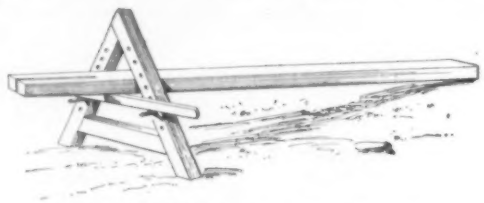
In Fig. 1 is shown a bracket attached to the back of an automobile seat, in such position as to hold the camera with the lens in about the same position as would be occupied by the eye of a person in the seat. This not only serves as a support to hold the camera when it is desired to make exposures, but it gives the novel effect shown in Figs. 2 and 3, where parts of the automobile are included in the foreground. This makes the pictures appear more nearly as if viewed from the machine, and greatly enhances their value as souvenirs.

The bracket may be bent up from a piece of ¼ inch by 1 inch cold-rolled steel, and by rounding off the sharp corners and giving it a coat of enamel, it may be made to match the trimmings of the car, to which it may be attached as a permanent fitting. When needed, the camera attaches to it in a moment, by means of the usual tripod thumbscrew, through a ¼ inch hole left for the purpose.

How to Hold Heavy Work to be Sawed

By William Grötzinger

A GOOD way to hold large heavy work that is to be sawed is shown in the sketch. The work is passed through the triangular opening in a wooden frame, nearly in the form of the letter A. When the frame and work lie at an obtuse angle, they constitute a three-legged stool. The upper edges of the board become wedged fast in the sides of the triangle, and the lower side of the board rests upon a cross piece,

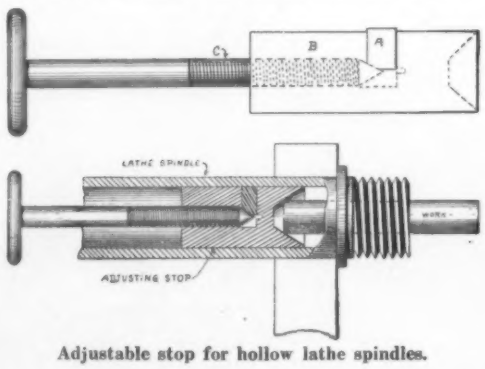


Device for holding boards to be sawed.

which can be placed at various heights, according to the size of work that is to be held. In sawing, the man rests his knee on the work, near the top of the frame, and the board is changed end for end, when sawn through half its length.

A Stop for Lathe Spindles

WHEN cutting off a large number of small shafts, much time is consumed in measuring the work at each cut. To save this time, the stop illustrated herewith was constructed. Not only did the device serve as a stop, but it assisted in holding the work concentric with the hollow lathe spindle. A small block *A* served to lock the stop *B* in the spindle at any desired position. When the stop had been adjusted to the desired location in the hollow spindle, the screw *C* was turned, causing the cone end of the screw to bear against the block *A* and jam it against the interior of the hollow spindle. After the stop had been locked in this way, the work was placed in the spindle and run back until it seated itself against the conical recess in the end of the stop, as shown in the sectional view.

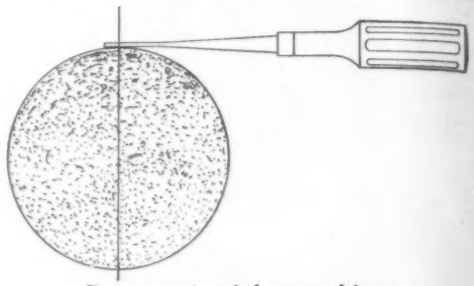


Adjustable stop for hollow lathe spindles.

How to Grind a Screw-driver

By H. D. Chapman

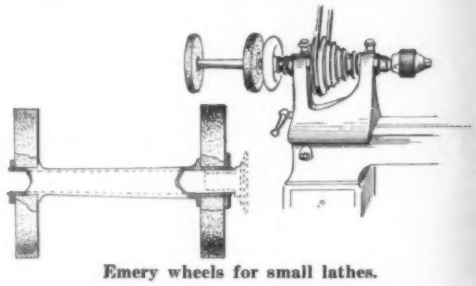
THERE are but few screw-drivers ground properly. The usual taper end of a screw-driver cuts the slot and the head of the screw away and will not move a screw that is hard to turn. The accompanying drawing shows the right way to grind the end of the blade. Place the end of the screw-driver a little beyond the center. The screw-driver ground in this way will seat itself in the screw and grip the bottom of the slot. The blade ground in this way will have little tendency to twist out when it is turned.



Proper way to grind a screw-driver.

Emery Wheels for Small Lathes

AN emery wheel may be attached to a watchmaker's lathe or to any hollow spindle lathe as follows: Use a hollow arbor with threads on each end. By a thin nut the wheels are held in place; the whole thing then is placed on the outer end of lathe spindle. By making a good fit the friction will carry the wheel. In use, a person does not have to make a change either on his lathe or otherwise, as it is within very handy reach for sharpening tools and drills. The drawing shows an enlarged view in section of the construction, also a view of the lathe head with emery wheels attached. It does not interfere in the least with working the handwheel or using the wire chucks in the lathe, and need very seldom be removed, although this may quite easily be done. It is better to use two wheels, one adapted for cutting down and the other much finer for producing a keen sharp edge.

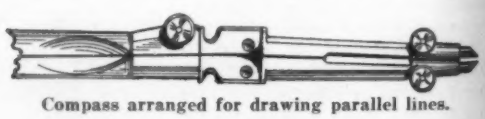


Emery wheels for small lathes.

Instrument for Drawing Parallel Lines

By H. Bickerstaff

IN the SCIENTIFIC AMERICAN of August 5th, 1911, and again in the issue June 22d, 1912, there appeared suggestions for drawing parallel lines. Here is another idea that I think even better. Insert a black lead in both legs of a compass and by running one leg against the T-square the parallel lines are drawn to any width required. This method is useful for other work besides drawing lines for lettering.



Compass arranged for drawing parallel lines.

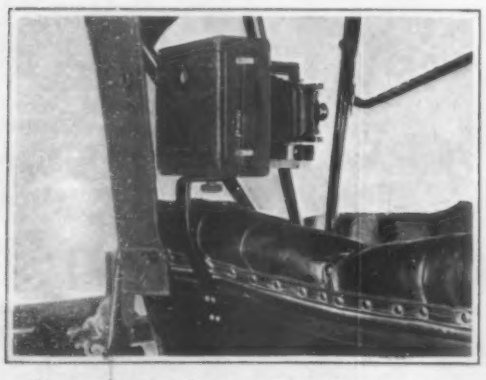


Fig. 1.—Bracket for supporting the camera on the automobile.

Fig. 2.—The old Cape Cod windmill, West Falmouth, Mass.

Fig. 3.—Through the Franconian Notch, White Mountains, N. H.

Inventions New and Interesting

Simple Patent Law; Patent Office News; Notes on Trademarks

Legal Notes

Abandonment of Trade-mark.—In the case of Levering Coffee Company v. Merchants Coffee Company the Court of Appeals of the District of Columbia holds that the right in a trade-mark is a property right and that intent to abandon must clearly appear from the facts and circumstances surrounding its non-use and that as in other cases intent may be inferred when the facts are shown adequate to support such a finding, but that acts which, unexplained, would warrant an inference of abandonment may be met by a showing of lack of abandonment.

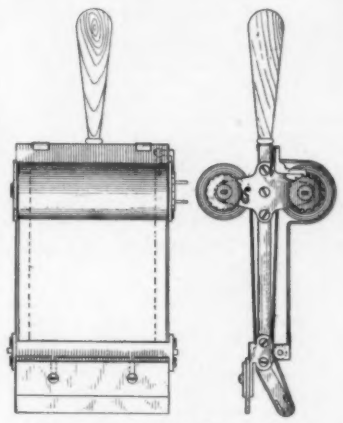
Beer and Near-beer.—In the case of the Independent Breweries Company, the Court of Appeals of the District of Columbia affirms the decision of the Commissioner and holds that a beverage composed of malt and containing less than one half of one per cent of alcohol constitutes goods of the same descriptive properties as beer; also that the mark "Amber Bead" is properly refused registration in view of the prior registration of "Amber" as a trade-mark for goods of the same descriptive properties.

Patents Adjudicated.—In the case of Draper Company v. Stafford Company, 196 Fed. Rep., 501, the Draper patent, No. 527,014, for improvement in looms was held not infringed, while in the case of Parke Davis & Co. v. H. K. Mulford & Co., 196 Fed. Rep., 496, the Takamine patent, No. 730,176, for a glandular extractive product known as "adrenalin," claims 1, 2, 9, 12 and 14 were held valid and infringed, while claims 6, 13 and 15 were not passed upon; and between the same parties, the Takamine patent, No. 753,177, for a glandular extractive compound was held valid and infringed as to claims 5 and 6, and claims 1 and 2 were not passed upon.

Amended Copyright Law.—By Act of Congress approved August 24th, 1912, the Copyright Law is supplemented with respect to moving pictures. The amendment specifically includes in the act the classes of "Motion-picture photoplays" and "Motion-pictures other than photoplays" and requires the deposit with claim of copyright of a title and description, with one print taken from each scene or act if the work be a motion-picture photoplay; or of a title and description, with not less than two prints taken from different sections of a complete motion-picture, if the work be a motion picture other than a photo play. The amended act also provides that in the case of the infringement of an undramatized or non-dramatic work by means of motion-pictures, where the infringer shall show that he was not aware that he was infringing, and that such infringement could not have been reasonably foreseen, such damages shall not exceed the sum of one hundred dollars; and in the case of an infringement of a copyrighted dramatic or dramatico-musical work by a maker of motion-pictures and his agencies for distribution thereof to exhibitors, where such infringer shows that he was not aware that he was infringing a copyrighted work, and that such infringements could not reasonably have been foreseen, the entire sum of such damages recoverable by the copyright proprietor from such infringing maker and his agencies for the distribution to exhibitors of such infringing motion-picture shall not exceed the sum of five thousand dollars nor be less than two hundred and fifty dollars. It is also provided by the act that the foregoing exceptions shall not deprive the copyright proprietor of any other remedy given him under this law, nor shall the limitation as to the amount of recovery apply to infringements occurring after the actual notice to a defendant either by service of process in a suit or other written notice served upon him.

Dry Cleaner for Windows, Mirrors, and the Like

IT is frequently desirable to clean glass in windows, mirrors, picture frames, show cases, and the like, without the use of water or other liquids which are liable to drop or be spattered in the operation. An inventor has recently hit upon the scheme of cleansing the window with a dry cleansing material, which is rubbed



Dry cleaner for windows, mirrors and the like.

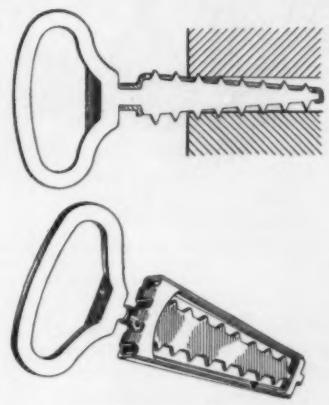
over the glass and which removes all dirt from the surface. The cleansing material is placed on a band of cloth supported in a frame similar to that shown herewith. The cloth band is wound on two rollers and may be fed from one to the other whenever it is desired to bring a fresh surface into play. At the point of application the cloth passes over a felt-covered plate. Directly back of this plate is a knife, which may be used for scraping such particles of dirt as adhere very strongly to the glass. With this device the glass can be cleansed without the use of any liquids.

Starting an Engine Pneumatically

JOHN A. HEANY, Washington, D.C., has secured a patent, No. 1,029,994, for an apparatus in the nature of an engine starter which includes, in connection with a pressure tank, a pneumatic appliance which is convertible from a motor to a pump and is located between the pressure tank and the engine shaft. Differential gearing is provided between the tank and the shaft and automatic clutches for the gearing, and means are provided for automatically throwing out the pumping gearing and locking such gearing out of action in order to convert the apparatus into a motor upon the attainment of a predetermined pressure in the tank. Thus, in operation, the pump acts to produce pressure in the tank and then when a certain pressure is attained the pump is thrown out of action and the apparatus is converted into a motor which can be utilized to start the engine.

Door-fastening Device

EVERY now and then a patent is issued upon an emergency device for locking doors, which would seem to indicate that there is a considerable demand for such an appliance. No doubt travelers frequently find themselves in hotel apartments inadequately equipped with locks. Under such conditions it would be convenient to have a pocket device for securing the door against intruders. The accompanying illustration shows a door securer consisting of a flat key formed



Door-fastening device.

with sharp teeth along each edge, and mounted to turn within a yoke. The key is turned to the plane of the yoke, and inserted between the door and the jamb. Then it is turned crosswise to wedge the sharp teeth into the wooden door and its frame. It is impossible to open the door under such conditions without tearing out the wood engaged by the teeth of the key.

A Pocket Typewriter

THE adoption of typewriters has within a few decades revolutionized the whole of office management and practically supplanted handwriting for commercial and official use.

Recent inventors seem, however, not to be content with this widespread success of the writing machine but wish to extend its use even further. These endeavors have on one hand resulted in the production of exceptionally light typewriters reduced to minimal dimensions, which can be readily carried about when traveling, and on the other hand in the invention of cheap typewriters suitable for those whose correspondence is too limited to warrant the purchase of a standard machine.

One of the most notable productions in this line is the pocket typewriter invented by Mr. Albert Fink. This has the form and dimensions of a big watch comprising on its dial the letters of the alphabet, the numerals and the signs. Its manipulation is extremely easy, the whole machine being slightly pressed against the paper after the proper letter has been adjusted for. After printing a letter it advances one space along the rack traversing the watch-like attachment, which also carries at its back edge the paper to be typed on. With some practice one gets up a certain, though of course modest, speed.

The whole arrangement is extremely simple and the price of course only a small fraction of the cost of even the cheapest regular typewriter. The principle used in connection with this machine is the same as that on which the very first typewriters were based.

A pocket typewriter of the form and size of a big watch.

Notes for Inventors

Protection of Metal Against Rust.—It is possible that some day, some one will invent or produce some means or method, or both, of preventing the destructive rusting of iron and steel embedded in the earth. Such an invention should be profitable, as it would make permanent and everlasting millions of tons of metal, which, under present practices, must be replaced after a few years use.

A Paper Stencil.—Sterling Elliott of Newton, Mass., in patent No. 1,034,600, shows a simple stencil strip from which stencils may be cut. It consists of a folded strip of paper with holes arranged in pairs so they will register when the strip is folded and a second strip of paper arranged between the folds of and pasted to the folded strip with both strips solidified and stiffened by the same adhesive substance.

Churning Butter by Air Currents.—A method of producing butter has been patented to Alpheus Fay of Louisville, Kentucky, No. 1,034,350, in which ebullition is produced in the body of the milk by the tangential collision of two volumes of air, the vessel having unobstructed concave walls. The ebullition is produced for a period of from 30 to 60 seconds.

Milking by Pedal.—A new milking machine was recently exhibited at the Royal Show at Doncaster, England, and attracted much attention. The feet instead of the hands are used for milking. The operator sits on a tricycle seat and pedals, drawing the milk from two cows simultaneously. Twenty to twenty-four cows can be milked in an hour by one milker with a cowman in attendance.

A Sound Muffler for Telephone Booths.—In patent No. 1,033,963, Edwin M. Surprise of Boston, assignor to American Telephone and Telegraph Company, presents a telephone booth having a ventilating tube so formed as to muffle the sound from within the booth. In the construction shown in the patent, the tube is provided with slots and with baffle plates secured in the slots and projecting partly across the tube and having flaccid edges over which the air current passes.

Why Not a Trunk Carrier?—Have you ever noticed the terrible strain upon the men who carry heavy trunks up and down stairs on their backs? Trunks do not seem to decrease but rather to increase in size. Surely there must be a limit to human endurance. It is in order for someone to devise a means whereby the transfer man will be relieved of some of his burden.

Trade-mark Notes

"Boy Scout" Not a Registrable Trade-mark.—Commissioner Moore in the case of *ex parte* Warner has held that the words "Boy Scout" are not registrable as a trade-mark for leggings, gloves and mittens, since as applied to such goods the mark is either deceptive or descriptive.

"Hygeia" as a Trade-mark.—Assistant Commissioner Tennant has held that the word "Hygeia" as a trade mark for coffee is not descriptive. The decision was rendered in the case of Levering Coffee Company v. Merchants' Coffee Company.

RECENTLY PATENTED INVENTIONS.

These columns are open to all patentees. The notices are inserted by special arrangement with the inventors. Terms on application to the Advertising Department of the SCIENTIFIC AMERICAN.

Pertaining to Apparel.

COLLAR AND TIE RETAINER.—C. A. BARNES, Missoula, Mont. This invention relates to a retaining attachment for turn-down cloth collars, and is designed to engage positively with both the ends of the collar and the tie of the wearer in order to hold them in proper position relatively to each other.

Pertaining to Aviation.

FLYING MACHINE.—C. V. JOHNSON, Goldfield, Nev. An object of this inventor is to provide a flying machine in which the main supporting surface is provided by means of a plurality of individual planes capable of pivotal movement and having their pivotal axes arranged on a diagonal, so as to vary the angle of the incidence.

FLYING MACHINE.—J. MALJKOVICH, 2480 8th Ave., Manhattan, N. Y., N. Y. The principal object here is to provide a form of machine having planes thereon which extend on opposite sides of the frame of the machine, each of these planes being curved in cross section, together with ailerons pivotally carried at the outer end of each of the planes, the ailerons being plane in cross section.

AEROPLANE.—ALBERT E. PETRUCCI, 1208 Clay Ave., Bronx, New York. The aeroplane invented by Mr. Petrucci has, in addition to the ordinary propeller, a horizontal propeller mounted above the pilot's head. This horizontal propeller may be used to assist in the initial levitation of the machine and in its

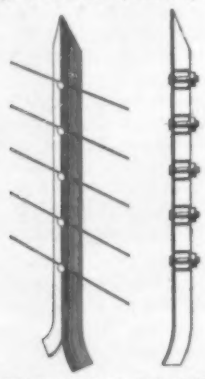
AEROPLANE WITH HORIZONTAL AND VERTICAL PROPELLERS.

alighting. Means are provided whereby the two propellers may be selectively discontinued or operated. The aeroplane is further provided with steering apparatus adapted for operation to alter the line of flight. It carries planes that operate as self-righting members to preserve the equilibrium of the machine in air. The perspective view is of the aeroplane as seen from the rear.

Of Interest to Farmers.

ALARM FOR INCUBATORS AND BROODERS.—J. TRAPP, R. F. D. No. 5, Valley Falls, Kan. The aim of this invention is to provide an alarm which in the event of a variation in the temperature within the incubator will be automatically sounded, notifying the attendant, who may at once give the necessary attention thereto as the conditions may require.

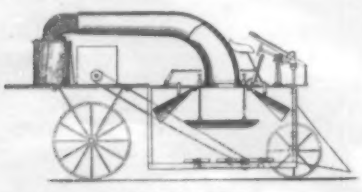
FENCE-POST.—PORTER KINNE BUSHNELL, Box 121 R. F. D. No. 1, Medina, New York.



FENCE-POST OF SIMPLE DESIGN.

As illustrated herewith, Mr. Bushnell's fence-post is constructed of metal in the form of an angular channel flaring at the bottom to form feet that will provide a firmer hold in the post hole. The wires of the fence are caught in notched bolts which pass through the corner of the fence-post and through blocks of triangular form fitted against the rear side of the post.

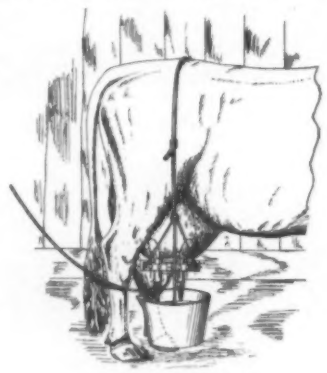
COTTON PICKER.—H. SKAER, Tamaroa, Ill. This cotton picker is arranged to readily remove or pick the ripe bolls of cotton from the plants without danger of injuring the



COTTON PICKER.

foliage or blossoms, and permits of repeated use to gather all the bolls as they gradually ripen from the plants upward to the top thereof. For this, use is made of air propellers arranged to pass along the lower portions of the plants and forcing an air blast upwardly against the bolls to detach the same from the plants, and a conducting tube above the plants for receiving the detached bolls. The engraving represents a longitudinal central section of the picker.

MILKING MACHINE.—O. C. SIBILSKY, Algoma, Wis. The invention pictured in the illustration in actual use, provides a machine which will cause the milking operation to be performed by compression rather than by suction or stripping; provides a device detachable so as to accommodate it for use in con-



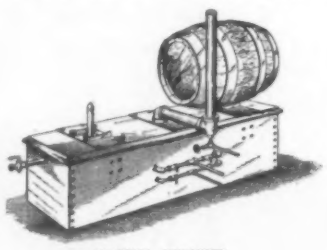
MILKING MACHINE.

nection with different size cows or those having different size udders; provides an actuator for the milker which is adjustable in accordance with the size of the teats; and provide a milking machine in which the compression cups are formed and operated so as to simulate the form and operation of a person's hand in hand milking.

Of General Interest.

FOOD PRODUCT.—P. H. MENTZ, 714 Hennen Bldg., New Orleans, La. This invention has reference to certain improvements in food products for animals, and the object of the invention is to provide a food product of a palatable nature and containing high percentages of protein and carbo hydrates.

BARREL HEATER.—R. DRONIA, 131 E. 83rd St., Manhattan, N. Y., N. Y. The object of this inventor is to provide a structure in which a flame may be used interiorly of the keg for heating the same. A further object is to provide a housing designed to be maintained substantially full of water, from which pro-



BARREL HEATER.

jects a heating device arranged to extend through the bunghole of a keg or barrel so that when the rosin or pitch in the keg or barrel has been melted the same will pass out the bunghole into the receptacle or reservoir and will be chilled by the water so as to quickly coagulate or solidify. A perspective view is herewith given of the invention showing a keg in position.

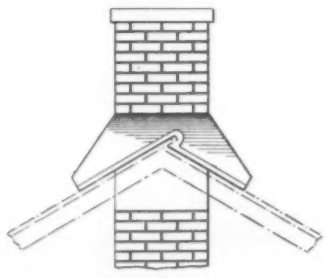
SPOOL HOLDER.—C. KAMP and E. SCHOPPE, 93 Columbia Ave., Jersey City, N. J. The purpose of his improvement is to provide a holder arranged to permit the user to conveniently unwind a desired thread from its spool without danger of entangling the thread, and to allow of readily cutting off the length of thread unwound from the spool.

FUNNEL.—JOHN J. LACY, 370 New Street, Perth Amboy, N. J. When a common funnel is used in filling a bottle and more liquid is poured in than the bottle will hold it is impossible to save that liquid which remains in the cup of the funnel. When the funnel

FUNNEL WITH VALVED SPOUT.

is removed the liquid pours out and is lost. The present invention provides a valve at the lower end of the funnel tube which is operated by a handle or hand lever projecting from the cup of the funnel. The valve may be kept open by means of a catch, which holds the valve hand lever in the dotted position. When the funnel is removed from the bottle the catch is released permitting the valve to close under the action of a leaf spring.

SMOKE-FLUE BASE.—W. A. DECK, 105 Buena Vista St., Newark, Ohio. In carrying out the objects of the improvement, a single block is cast of concrete or constructed in any desired manner, arranged with a projecting lower portion for engaging the interior part of the chimney, and an upper squared portion for engaging the exterior part of the chimney. Radiating from the upper part of



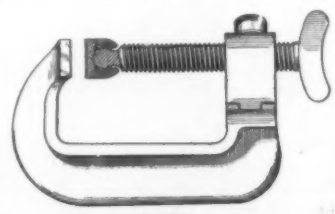
SMOKE-FLUE BASE.

the block is a substantially circumferential flange which defines a pair of over-hanging members designed to thoroughly protect the opening in the roof through which the reduced part projects. The side view presented is an embodiment of the invention shown applied, part of the chimney and part of the roof being shown in connection therewith.

SPRAYING COMPOUND MIXER.—N. J. WIGGINTON, Winchester, Va. This inventor provides a device in which substances such as sulfur and lime may be mixed with water so as to insure the production of a homogeneous substance. Also a device which will automatically mix the ingredients of the spraying solution, said device being provided with arms or scrapers which tend to scrape solid portions of the mixture toward the central part of the device, thereby preventing the clogging of the device.

Hardware and Tools.

CLAMP.—J. VANDENBURG, R. F. D. No. 2, Cortland, N. Y. This invention comprises a substantially U-shaped frame, with a thumb screw mounted in one arm of the frame and movable toward and from the other arm. The arm carrying the screw has a special formation to constitute a split nut, so that the



CLAMP.

screw may be removed instantly and replaced to adjust it approximately to the work being clamped, the tightening of the screw being effected by turning in the usual manner. In this way the screw can advantageously have a fine thread, since a quick movement is not necessary after the approximately bodily adjustment. In connection with the screw an improved form of swiveled head is provided. The engraving gives a side elevation of the clamp, the head of the screw being shown in section.

NOTE.—Copies of any of these patents will be furnished by the SCIENTIFIC AMERICAN for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

WE wish to call attention to the fact that we are in a position to render competent services in every branch of patent or trade-mark work. Our staff is composed of mechanical, electrical and chemical experts, thoroughly trained to prepare and prosecute all patent applications, irrespective of the complex nature of the subject matter involved, or of the specialized, technical, or scientific knowledge required therefor.

We are prepared to render opinions as to validity or infringement of patents, or with regard to conflicts arising in trade-mark and unfair competition matters.

We also have associates throughout the world, who assist in the prosecution of patent and trade-mark applications filed in all countries foreign to the United States.

MUNN & CO.,
Patent Attorneys,
361 Broadway,
New York, N. Y.

Branch Office:
625 F Street, N. W.,
Washington, D. C.

INQUIRY COLUMN

READ THIS COLUMN CAREFULLY. You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. *In every case it is necessary to give the number of the inquiry.* Where manufacturers do not respond promptly the inquiry *may* be repeated.

MUNN & CO., INC.

Inquiry No. 9255. Wanted to buy a patent roller, a ball-bearing axle, which could be purchased on a royalty basis; it must be cheap and fully proved.

Inquiry No. 9256. Wanted addresses of parties having Pitchblend deposits, if able to ship ore.

Inquiry No. 9257. Wanted addresses of firms selling second-hand water turbines.

Inquiry No. 9258. Wanted addresses of parties having gem materials to offer any part of the world.

Inquiry No. 9259. Wanted to buy a machine for removing the coating of a filbert.

Inquiry No. 9260. Want addresses of parties able to ship corundum, garnet, flint, emery or any material suitable as an abrasive.

Inquiry No. 9261. Wanted a manufacturer to make card games.

Inquiry No. 9262. Wanted to buy a glass which is a conductor of electricity, and the address of the makers of the same.

Inquiry No. 9263. Wanted name and address of manufacturer of pantaloon stretchers with clamps, which is capable of being folded up.

Inquiry No. 9264. Wanted the name and address of manufacturers of date pitting machines.

Inquiry No. 9265. Wanted the names and addresses of manufacturers of machinery for making picket fences.

Inquiry No. 9266. Wanted to buy machinery for fastening wire cloth to wooden frames with coppered tacks.

Inquiry No. 9267. Wanted addresses of manufacturers of metal specialties in connection with plate or window glass.

Inquiry No. 9272. Wanted names and addresses of engravers and mounters of fine quality maps or plans of large cities. Large order.

Inquiry No. 9273. Wanted to buy a globe for a parlor fountain, working on the Heron system.

Inquiry No. 9274. Wanted the name of a manufacturer of a machine to make cushion covers for fruit crates.

Inquiry No. 9275. Wanted name and address of manufacturer of stock patterns of platen job printing presses.

Kindly keep your queries on separate sheets of paper when corresponding about such matters as patents, subscriptions, books, etc. This will greatly facilitate answering your questions, as in many cases they have to be referred to experts. The full name and address should be given on every sheet. No attention will be paid to unsigned queries. Full hints to correspondents are printed from time to time and will be mailed on request.

(12683) J. E. G. asks: 1. Is it not possible to counteract the poison of venomous serpents by the stinging of many bees in the vicinity of the wound? A. We are not an authority upon antidotes for serpents' bites. Your proposition to use the stinging of bees for this purpose seems to be good homeopathic doctrine, but we cannot give judgment in the case. 2. Is it not possible that the crossing of our northern mosquito with the tropical breeds will produce a species that will not survive our winters? A. Probably a cross among species of mosquitoes would produce a variety which could be frozen out in winter, but we do not see how the addition of one more breed would kill off the breeds we now have. This pest has been found in every latitude and in most longitudes, and the best remedy for it would seem to be to kill it on the spot where it is found. Our scientists tell us it does not wander far from its birthplace, and if exterminated in any locality, that locality can easily be kept free from its ravages.

(12684) E. G. S. asks: I came across an article the other day entitled "Great Step in Electroplating." Two Italian chemists have invented a process for electroplating china, wood, glass, etc., which are non-conductors of metal, with copper, silver, gold, etc. Can you give me any information about it? Do you know who the chemists are and what the process is? A. We have not seen the article on a "Great Step in Electroplating," to which you refer, and cannot say what there is which is *new* in it. But we saw glass electroplated with copper about 1880, and even the tender petals of flowers have in more recent years been electroplated so that hatpins and other articles have been ornamented with metal roses and pinks, made by plating the real flower which was still inside the metal covering. The process was fully described in the SCIENTIFIC AMERICAN, vol. 99, No. 22. Valuable papers about electroplating on wood and other non-conductors may be found in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1190 and 1204, and in the SCIENTIFIC AMERICAN, vol. 106, pages 220 and 263. We will send the five papers for fifty cents. We regret that we have not the specific information you request, but hope that you may find in our references equally good processes for reaching the same results.

(12685) A. N. H. asks: 1. Is the old theory that there is no sound unless there is someone there to hear it, correct? A. The statement you quote about sound is a psychological one. Sound is to the psychologist a sensation in the nerve centers. Apart from the auditory nerve and the brain there is no sound. To the physicist sound is such a rate of vibration of ponderable matter as is able to excite the auditory system. The vibration exists whether there is a nerve to receive it or not. The dictionaries define sound in both these senses. It is necessary to discriminate the sense in which the word is used. Both are correct. 2. How do we locate sound, or its starting point, from a few feet to a mile or even two miles away? A. We locate a sound by our sense of direction, which we exercise by turning the ear to different directions and judging of loudness and distinctness. If the sound has been reflected, we can only determine the last direction in which it traveled. Its loudness will be that which is due to the total distance over which it has passed. 3. What do we get over a telephone, say, a hundred and fifty miles away, when we can recognize plainly the voice of some friend? A. Over the telephone line only a current of electricity passes from transmitter to receiver, even a thousand miles away. The voice speaking into the transmitter, as it were, carves and forms the telephonic current into a wonderful shape peculiar to the voice of the speaker. At the receiver this current causes vibrations in the diaphragm of sheet iron, which produce sounds identical with those spoken into the transmitter a thousand miles away. It is wonderful, magical. In all the intervening distance there is no sound, no motion of matter, only the pulsation of the other of space which we call a current of electricity. 4. How much power is there in a spring similar to a watch or clock spring, proportionately the same, only a good deal larger, say, for instance, a spring four inches wide? Would there be a horse-power in it, more or less? A. The power which can be obtained from a spiral spring such as is used in a watch is measured by the weight it can lift. If it can lift one pound one foot in one second, its power is one foot pound per second. If it could lift 55 pounds 10 feet in a second, it would have one horse-power. What power a spring four inches wide could exert would depend largely upon the quality of the steel and the thickness of the metal. Data for various springs are given in Kent's "Mechanical Engineers' Pocket Book," which we can send for $5.00.

NEW BOOKS, ETC.

MICROBES AND TOXINS. By Dr. Etienne Burnet of the Pasteur Institute of Paris. With a Preface by Elie Metchnikoff. Translated from the French by Dr. Charles Broquet and W. M. Scott, M.D. Illustrated. New York: G. P. Putnam's Sons, 1912.

In a gracefully worded introduction Prof. Metchnikoff informs us that of all his staff he considers Dr. Burnet one who is most admirably fitted to write this book. Dr. Burnet has acquitted himself with credit. He has given us a wonderfully compact, instructive, well-written book on the chief problems that confront the modern bacteriologist. Although there is much in the book that would appeal more to the technical bacteriologist than to the ordinary lay reader, it must be confessed that it lends itself well to the purposes of the general reader who is seeking some explanation of the work that the modern bacteriologist is doing in discovering the effect of microbes on the world in which we live.

EVOLUTIONARY BIOLOGY. By Arthur Dendy, D.S.B., F.R.S., Professor of Zoology in the University of London. New York: D. Appleton & Co., 1912. 8vo.; 454 pp.

This book is intended to be of use to those who have had no special biological training as well as to students who are taking the ordinary first year's course. Accordingly, in the earlier chapters the author has dealt in a very elementary manner with the structure and functions of both plants and animals. The type system has been altogether discarded as unsuitable for a work of this kind, although of course the author has been obliged to refer to numerous different organisms in illustrations of special points. Although the entire work is intended to be of an elementary character, it has been impossible, in connection with the theory of heredity, to avoid, on the one hand, a considerable amount of cytological details, and, on the other, some discussion of theoretical speculation of a highly controversial nature. In dealing with these controversial questions, which underlie the whole problem of organic evolution, the author has endeavored to present the views of opposing schools of thought as clearly as possible, but he freely expresses in his preface that he has ventured to lay considerable stress upon ideas which, though widely accepted elsewhere, have not as yet met with much appreciation in England.

COMMERCIAL ENGINEERING FOR CENTRAL STATIONS. By Arthur Williams and Edmund F. Tweedy. New York: The McGraw-Hill Book Company, 1912. 8vo. Price, $2.50.

Mr. Williams is past president of the National Electric Light Association and a member of the American Institute of Electrical Engineers, a man whose business career has been identified almost entirely with the electrical industry. Mr. Tweedy is a commercial engineer of repute. Together these men have given us a work which must surely be of immense value to those who guide the destinies of central stations. The book serves the useful purpose of showing how central stations may widen the field of application for current. Of the scope of the book, some idea may be obtained from the following chapter headings: I. Estimating the amount of coal required to heat a modern city building. II. Cooling the air of buildings by means of mechanical refrigeration. III. Mechanical refrigeration for the cold storage of furs and fabrics. IV. The application of mechanical refrigeration to ice-cream making. V. The cost of generating electrical energy in steam-driven central stations of small and of medium size. VI. Kilowatt-hour costs in steam-driven generating plants. VII. Central station load factors. VIII. Electricity in the modern department store. IX. The passenger elevator in office building service. X. Ozone: its production and utilization. XI. The use of electricity for the disinfection of sewage.

THE ELEMENTS OF STATISTICAL METHOD. By Willford I. King, M.A. New York: The Macmillan Company, 1912. 12mo.; 250 pp. Price, $1.50 net.

There seems to be a distinct field for a text-book of this nature, and the author is to be congratulated on the manner in which he presents his subject. He is correct in his assumption that most of those called upon to make practical use of statistics are by no means expert mathematicians, and the work in hand keeps strictly to the simpler, basic theorems of statistical method. The first division of the book is introductory and explanatory. The second division deals with the determination of the statistical unit, the collection of data, approximation and accuracy; the third takes up the problems of tabulation, diagrams, types and averages, dispersion, and skewness. The fourth and final division presents various methods of comparison, correlation, and the ratio of variation. Some valuable appendices complete the work.

NATURFORMEN. 1. Serie: Mikroskopische Vorbilder, Kristallformen. Von H. Schenk. Neue Formen fuer den Ornamentiker. Ausschnitte aus der schaffenden Natur in einer Fuelle eigenartiger, ewig wechselnder Motive. Stuttgart: Geschaeftsstelle des Mikrokosmos-Frankh'sche Verlagshandlung.

This series of admirably reproduced microphotographs of crystals, etc., is intended to be of service to the designer of textiles, ceramics, graphics and the like, by suggesting new designs. There can be no doubt that a series of such microphotographs must be of immense suggestive value.

EPICYCLIC TRAINS, which play an important part in toothed gearing, are ably described in Scientific American Supplement 1524. Price 10 cents. For sale by Munn & Co., Inc., and all newsdealers.

The Gordon Bennett Contest

(*Concluded from page 245.*)

minium to cleave the air with minimum resistance.

The bow of the Deperdussin monoplane seems excessively blunt to be of good stream-line form. This might be remedied by more pronounced tapering of the wind shield jutting before the propeller. Unfortunately, the revolving cylinder motor, with its outer diameter of 34½ inches, seems necessarily to imply a large body resistance. With a water-cooled motor entirely housed in a well-tapered bow, and with the radiator surface on the outer side of the hull, the body resistance might be much reduced. There seems, therefore, to be much improvement possible in the aerodynamic features of this machine. But even as it stands, Vedrines predicts that by using his smaller racing wings he will be able to attain a speed of 125 miles per hour. He did not use these small wings because he was not pressed by serious competition in the race.

Little need be said of the 100 horse-power Deperdussin piloted by Prevost, except to note that its average speed for the entire course was 100.05 miles per hour, as against Vedrines' record of 105.5 miles an hour. The propeller measured 2.40 meters in diameter by 2.60 meters pitch. In general appearance and in structure and control, it was like the higher-powered machine.

The Hanriot 100 horse-power monoplane, piloted by Frey, bears a very close resemblance to the well-known Nieuport, with its quadrangular-sectioned fuselage, its peculiar form of wings and its landing chassis. But it has too much resistance, and is too slow for the best speed. When overhauled in its course by the smaller Deperdussin, their difference of speed was very manifest to the eye.

The result of the contest, while somewhat disconcerting to Americans, will, it is hoped, benefit them. The wonderful flying of the French airmen, and the helplessness of the Americans with their untried and hurriedly-built monoplane, proved a dramatic and severe lesson on the need of scientific and systematic preparation, as well as of effective team play. If the contest had been waged for command of the air against a great military power, such defeat would have been sad.

Vedrines affirms that the greatest difficulty confronting the designer of racing aeroplanes is to provide for safe landing. Even at his present speeds he thinks the landing too dangerous. He contemplates a design which will admit rising and landing at moderate velocities while allowing much greater speeds well above the ground. The problem is to adapt the wings to lift the machine at moderate speeds and again no more than just sustain it at the maximum speed in regular flight.

Playing Polo With Stripped Cars

IN Wichita, Kans., a number of expert automobile drivers indulged in a game of polo recently, in which the part of the ponies was taken by stripped motor cars. The game was played in three 10-minute series, to a 1-1 tie score. The goals were 60 feet apart, and in the whirlwind driving one of the cars turned a complete somersault, without, however, injuring anybody.

Popular Flying Machine Subscription in Italy

BY popular subscription funds have been placed at the disposal of the Italian government for the donation of a fleet of one hundred aeroplanes. All told there are about ten aeroplane factories in Italy. Some of them would undoubtedly profit by this popular interest in the military aspect of aviation.

The Motor Truck Department

IT has been found necessary to postpone the Motor Truck Department which was advertised for the present number. The first issue of the Department will appear in the SCIENTIFIC AMERICAN of September 28th, 1912.

THE ROTARY STEAM ENGINE

¶ The Rotary Steam Engine has attracted the best thoughts of inventors and students for many years. All interested should read carefully the very complete information found in the files of the Scientific American Supplement. Every class and type of rotary engines and pumps is described and illustrated.

Scientific American Supplement 470 describes the Harrington Rotary Engine, a form of intermittent gear.

Scientific American Supplement 497 describes Fielding & Platt's Universal-joint Rotary Engine.

Scientific American Supplement 507 describes the Jacomy Engine, a square-piston type.

Scientific American Supplement 528 describes Inclined-shaft Rotary Engine, using the universal-joint principle.

Scientific American Supplement 558 describes the Kingdon Engine, a "wabble-disk" design.

Scientific American Supplement 636 describes Riggs' Revolving-cylinder Engine, suggesting the present Gnome motor.

Scientific American Supplement 775 describes Revolving-cylinder engines of several forms.

Scientific American Supplement 1109-1110-1111 contains a series of great interest, describing and illustrating all the principal types of rotary engines and pumps. This set should be studied by every inventor and designer.

Scientific American Supplement 1112 describes the Filtz Rotary Motor, using helical surfaces.

Scientific American Supplement 1158 describes Hult's Rotary Engine, an eccentric-ring type.

Scientific American Supplement 1193 describes Arbel & Tihon's Rotary Motor, an ingenious eccentric type, now on the market as a pump.

Scientific American Supplement 1309 describes The Colwell Rotary Engine, in which a piston travels entirely around an annular cylinder.

Scientific American Supplement 1524 describes Rotary Engine on the intermittent-gear principle.

Scientific American Supplement 1534 contains a valuable column on the difficulties of rotary engine design.

Scientific American Supplement 1821 contains an article describing many new forms of rotary engines of the most modern design.

Scientific American, No. 23, Vol. 102 contains a full description of the recent Herrick Rotary Engine, an eccentric type with swinging abutment.

Scientific American, No. 23, Vol. 104 describes Jarman's Engine, on the sliding-valve principle.

Scientific American, No. 14, Vol. 106 describes the Augustine Rotary Engine, with novel features incorporated in the sliding-valve design.

Each number of the Scientific American or the Supplement costs 10 cents. A set of papers containing all the articles here mentioned will be mailed for $2.00. They give more complete information on the subject than a library of engineering works. Send for a copy of the 1910 Supplement Catalogue, free to any address. Order from your newsdealer, or the publishers

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The Chemical Congress

¶ For the first time in history the International Congress of Applied Chemistry has met here in the United States.

¶ Among our guests are some of the most distinguished men of the profession—men whose work will be written in indelible characters in the record of the industrial and scientific advances of our age.

¶ Such an occasion demands our special notice and attention.

¶ Several pages of the current issue of the Scientific American Supplement have therefore been devoted to a general survey of some of the chief papers presented before the Congress. A number of articles specially selected from among the seven hundred odd contributions made to the Congress will also appear in the current and subsequent issues of the Supplement.

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Under this name, beginning with the next issue, we shall continue to publish the complete, accurate and official record of the progress of Aeronautics.

Wilbur Wright's

last message to the world on the science of which he was the acknowledged master is published in September.

On the days preceding that fatal illness which removed from the world one of the great figures of the Twentieth Century, Mr. Wright was engaged in writing this article for The Aero Club of America Bulletin. It is of vast importance and will be eagerly read by thousands in America and Europe. Month by month we are publishing articles by the world's leaders and experts, the pioneers of the movement. No other magazine has such a list of contributors.

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